ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC

GUIDELINES ON ENVIRONMENTALLY SOUND DEVELOPMENT OF COASTAL TOURISM

UNITED NATIONS

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FOREWORD

Asia and the Pacific has outperformed many other regions of the world in tourism growth and development. A major underlying factor in the high tourist potential of the region is its coastal tourism assets. The coastal environment will continue to shoulder higher pressure from fast-growing tourism, at least, in the coming decade. This calls for a more vigilant approach towards the environment, which is the very basis of the tourism industry. Already signs of adverse impacts of the tourism on coastal environment are visible in the problems of waste disposal, pollution of marine water, erosion of coastlines and damage to fragile ecosystems such as coral reefs, mangroves and small islands.

It is no longer appropriate to think of environmental protection and tourism development as conflicting or competitive. They are complementary and compatible courses of action. In the period following the United Nations Conference on Environment and Development, held at Rio de Janeiro, Brazil in 1992, countries have developed support for the principles of sustainable development, the patterns of growth which husband natural resources in a way that maintains their capability to deliver future benefits. No other economic activity lends itself to this approach better than tourism.

To assist countries in tourism development, ESCAP undertook a project on incorporation of environmental considerations in coastal tourism development planning. Case studies were undertaken in six selected countries of the region, guidelines were prepared on state-of-the-art environmentally sound coastal tourism planning and a workshop was held to review the guidelines for finalization.

The guidelines contained in the present publication are the most important output of the project. They attempt to identify the cause-effect relationship between tourism and the environment in coastal locations and to illustrate remedial and preventive measures that can be adopted to promote the environmentally sound and sustainable development of coastal tourism. While focusing mainly on tools and methodologies, the guidelines also bring together the experience of selected countries in promoting sustainable tourism development in coastal areas of the region.

I wish to express my deep appreciation to the Government of Japan for its financial support which facilitated the implementation of the project and sincerely hope that these guidelines will assist decision makers, policy planners, investors and promoters of tourism in mitigating the environmental impacts of coastal tourism development in the Asian and the Pacific region.

Rafeeuddin Ahmed
Executive Secretary

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INTRODUCTION

A. Background of the study

The growth of tourism has induced many benefits to the coastal areas but its unplanned expansion has also resulted in serious environmental costs. There are several examples of negative impacts of uncontrolled tourism on the ecological resources of resort areas. For example unplanned and ill managed coastal tourism has led to the degradation of nearshore marine habitats as a result of the sewage pollution originating from the tourism associated establishments. Boating, a coastal tourist activity has also affected the marine habitats which support a treasure of biological diversity. Anchor dropped by boats smash coral on landing and by dragging or unwrenching it, causing extensive destruction to coral branches. In some instances, mangroves, reefs and seagrasses have been removed and dredged for the construction of marinas and boat basins. Tourist demand for seafood such as lobster has been responsible for overfishing in many places, which has led to a decline in the average size of the catch. Other effects include the discharge of large quantities of sediment from the construction of coastal tourism development projects and related activities, and the commercial collection of corals and other marine specimens. These facts clearly indicate that the balance between tourism and environment is very delicate. It needs to be maintained through appropriate planning and sustainable management of tourism resources.

The principle of environmentally sound management of sectoral and cross sectoral development was recognized by the Economic and Social Commission for Asia and the Pacific (ESCAP) in its resolution 267(XLIV) of 20 April 1988 on the adoption and implementation of the principle of environmentally sound and sustainable development in the Asian and Pacific region. It was further affirmed in the Ministerial Declaration on Environmentally Sound and Sustainable Development in Asia and the Pacific, made at the Ministerial-level Conference on Environment and Development in Asia and the Pacific, held at Bangkok in October 1990. Subsequently it led to the development of the Regional Strategy on Environmentally Sound and Sustainable Development which was endorsed by the Commission through its resolution 47/7 of 10 April 1991 on the integration of environment and development in Asia and the Pacific. The Regional Strategy outlines a broad framework of priorities and action points addressing both sectoral and cross sectoral issues. Referring specifically to tourism sector in the Asian and Pacific region it states that tourism is to be promoted without causing adverse effects on the local culture and tradition. Necessary steps also need to be taken to ensure compatibility between tourism and conservation of the natural environment and heritage sites.

The present study on the environmental management of tourism has been undertaken in line with the various resolutions adopted by the Commission on environmentally sound and sustainable development (ESSD) mentioned above. The Secretariat's efforts in this endeavour were generously supported by the Government of Japan. While focusing mainly on methodologies, the study illustrates the remedial and preventive measures in promoting sustainable coastal tourism development in the region. It also brings together the experience of selected countries in undertaking tourism development projects in the region. The primary objective of the study is not only to draw the attention of decision makers and planners in the region to some of the critical issues and concerns but also to provide them guidelines on tools and methods which can be used for maintaining a balance between coastal tourism development and the environment.

B. Objectives of the guidelines

There are two basic purposes of the guidelines. Firstly to provide a checklist of tourism activities along with a survey of resources of coastal environment and the causal effects on environment resulting from the interrelationship between the two and secondly to discuss tools and methods for promoting environmentally sound management of coastal tourism development. Within this broad framework the detailed objectives of the regional guidelines are:

(a) To review and analyse available information on coastal tourism development and associated activities through literature survey and case studies;

(b) To identify the environmental impacts of tourism development in the coastal areas;

(c) To propose measures to be taken by both the Government and tourism industry for prevention of environmental problems and for enhancement of environmental values for tourism;

(d) To provide general EIA methodologies as well as some technical guidelines on environmentally sound management of coastal tourism development;

(e) To recommend policies conducive for integration of environmental consideration into coastal tourism development planning in the countries of the region.

C. Scope of the study

The study derived information primarily from the experiences of six country case studies which were conducted in Fiji, Indonesia, Malaysia, Maldives, Philippines and Thailand. These countries represented a cross-section of geographical sub-regions within ESCAP, had dynamic and rapidly growing coastal tourism industry and faced challenges which could provide important lessons to other countries of the region.

The study in its first part describes the extent, size, resource base and activities of the tourism industry in the region. An analysis has then been carried out of the environmental effects of these activities on the various components of environment i.e. physical environment, ecological environment, human use and quality-of-life values. A detailed checklist of impacts has been developed to give an idea of interrelationships between activities, types of impacts and the areas or resource zones (in the coastal environment) affected.

Measures that can be undertaken to control adverse environmental impacts, prevent environmental problems, and enhance environmental values for tourism follow next. These have been discussed in five categories i.e. planning, legislative, institutional, educational/environmental awareness and supportive measures. Environmental Impact Assessment (EIA), which has proved to be an effective management tool, has received detailed treatment in this section of the study.

Guidelines on technical measures related to water pollution control, safe water supply, solid wastes disposal, air pollution and noise control, and management of resources have been discussed in the next part. This is followed by social/cultural impacts of tourism related activities along with guidelines on monitoring of their adverse impacts and mitigation. The final part of the study gives recommendations on policy formulation and implementation.

I. TOURISM GROWTH AND SUSTAINABILITY

During the past two decades, tourism in general and coastal tourism in particular experienced impressive growth in the Asian and pacific region. (tourism sector often exceeded the regions growth in gross domestic product). This growth has generally led to the creation of additional employment, increased flows of scarce foreign exchange and improvement of infrastructure in and around resort areas. This chapter examines the size, growth trends and contribution of tourism to the economy to give an overview of this important sector in relation to its resource base. It also delineates the categories of tourism and emphasizes, the dominant role of the coastal tourism in the region. A detailed breakdown of activities related to coastal tourism follows with a schematic presentation of spatial relationship between the activities and resource zones of the coastal environment in which they are taking place. Emphasis has been placed on care needed in undertaking activities in these zones rich in fragile resources such as mangroves, seagrass, and coral reefs.

A. Tourism growth trend in the ESCAP Region

World Tourism Organization (WTO)[1], has reported that the tourism industry of the ESCAP region is significant and expanding rapidly. In 1993, the region attracted about 72 million international tourists accounting for about 15 per cent of the world share. This was only 1.3 per cent in 1960 (figure 1.1). East Asia and the Pacific registered a 15 per cent average annual growth rate of arrivals between 1950 and 1991[2], the highest among the world regions and twice the global average. The most significant part of this growth occurred during last decade (1983-93) which recorded an increase of 55 million arrivals. A major contributor to this increase has been the intra-regional tourist traffic particularly from Japan and the newly industrialized economies in the region. Rapid economic growth in these countries stimulated demand for intraregional travel both for leisure and business.

In terms of revenues also, Asia and the Pacific recorded highest increase in tourism receipts in the world with an average annual growth rate of over 15 per cent during the last four decades. The growth took place mainly during the last decade (1983-93) which saw receipts increase by 42 billion dollars. The region accounted for 18 per cent of the world tourism receipts in 1993 compared to only 3.3 per cent in 1960 (figure 1.2).

Looking back to 1950, there was no place for any country or area in the ESCAP region in the world's top 25 tourist destinations and earners. Two decades later, only Hong Kong could manage to achieve 24th rank in the world top 25 tourist destinations. But by

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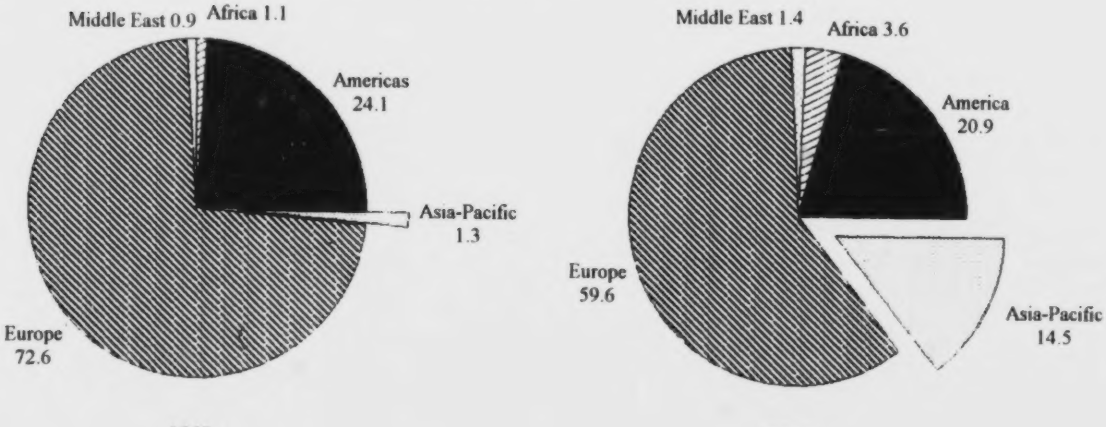
[1] a. World Tourism Organization (1994), *Tourism Market Trends East Asia and the Pacific 1980-93*, Madrid.

b. World Tourism Organization (1994), *Tourism Market Trends South Asia*, Madrid.

[2] World Tourism Organization (1991), *Tourism Trends Worldwide 1950-91*, Vol. 1, pp. 6-28, Madrid.

Figure 1.1 Asia-Pacific share in world tourist arrivals 1960-1993

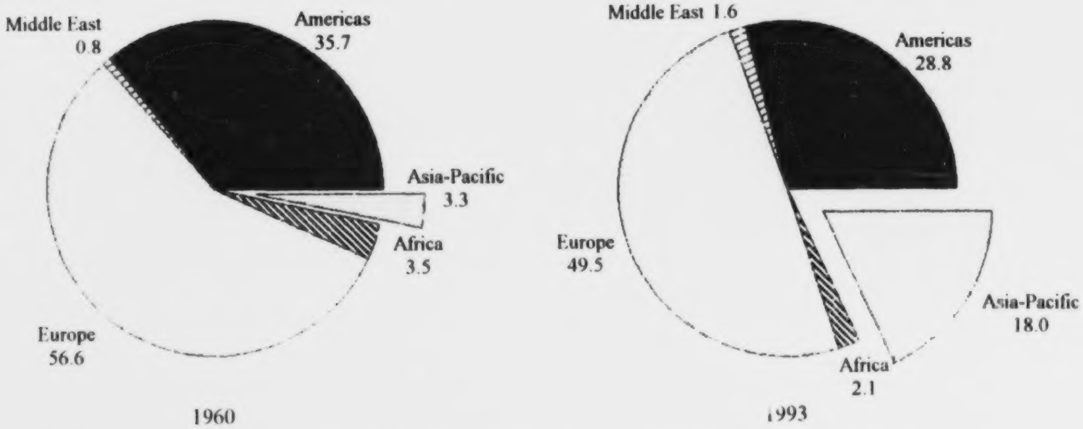


1960

1993

Source: 1. World Tourism Organization (1994) *Tourism Market Trends East Asia and the Pacific*, Madrid.
2. World Tourism Organization (1994) *Tourism Market Trends South Asia*, Madrid.

Figure 1.2 Asia-Pacific share in world tourism receipts 1960-1993



Source: 1. World Tourism Organization (1994) *Tourism Market Trends East Asia and the Pacific.* Madrid.
2. World Tourism Organization (1994) *Tourism Market Trends South Asia.* Madrid.

1991, four other countries — China, Malaysia, Singapore and Thailand also entered this list. In terms of foreign currency earning from tourism, Hong Kong, Singapore, Thailand, Australia, Japan, China and Indonesia appeared in the list of world's top 25 earners by 1991.

B. Tourism industry in case-study countries

During the last two decades, tourism industry played a significant role in the economic development of most Asian and the pacific countries. International tourism expansion has been actively pursued by national governments because of its positive effects on national income, the balance of payments, the level of employment and the diversification of the economic structure. Among the six selected countries in this study the growth in tourist arrivals during the last decade has been most significant in Maldives followed by Indonesia, Malaysia, Thailand, Fiji and Philippines (figure 1.3). In term of magnitude Malaysia received the highest international tourist arrivals in 1991 (around 5.8 million) while Maldives attracted the smallest volume of 195,000 visitors which nevertheless is quite big when compared with the size of its population (about 220,000).

Tourism is the major foreign exchange earner in all the case study countries. For example in Thailand in recent years it constituted about 19 per cent of the total revenue derived from the country's major exports. Data for 1991 indicates that tourists who arrived in the country stayed for an average of seven days. In Maldives tourism accounted for 60 per cent of export receipts in 1991, and is a major source of income to the government. The number of tourist in Maldives increased more than 4 time over the past 10 years.

Penang, Malaysia: its architecture attracts many tourists

Tourism was the fourth largest foreign exchange earner in Malaysia in 1991 after manufactured products, crude petroleum and palm oil. It offered direct employment to about 80,000 people. The success of Visit Malaysia Year 1990 spurred an unprecedented growth in investments in tourism projects including hotels in 1991. According to the Malaysian Industrial Development Authority total investment in the sector leapt over 330 per cent from only 632 million Malaysian dollars in 1990 to 2759 million Malaysian dollars in 1991[3].

In Fiji tourism experienced a rapid growth since the late sixties despite some fluctuations. The marketing of Fiji's image worldwide has been pursued under the terms of the four "S", sea, sand, sun and smiles, that is focusing on local friendly population and coastal resources. The Government has put the accent on

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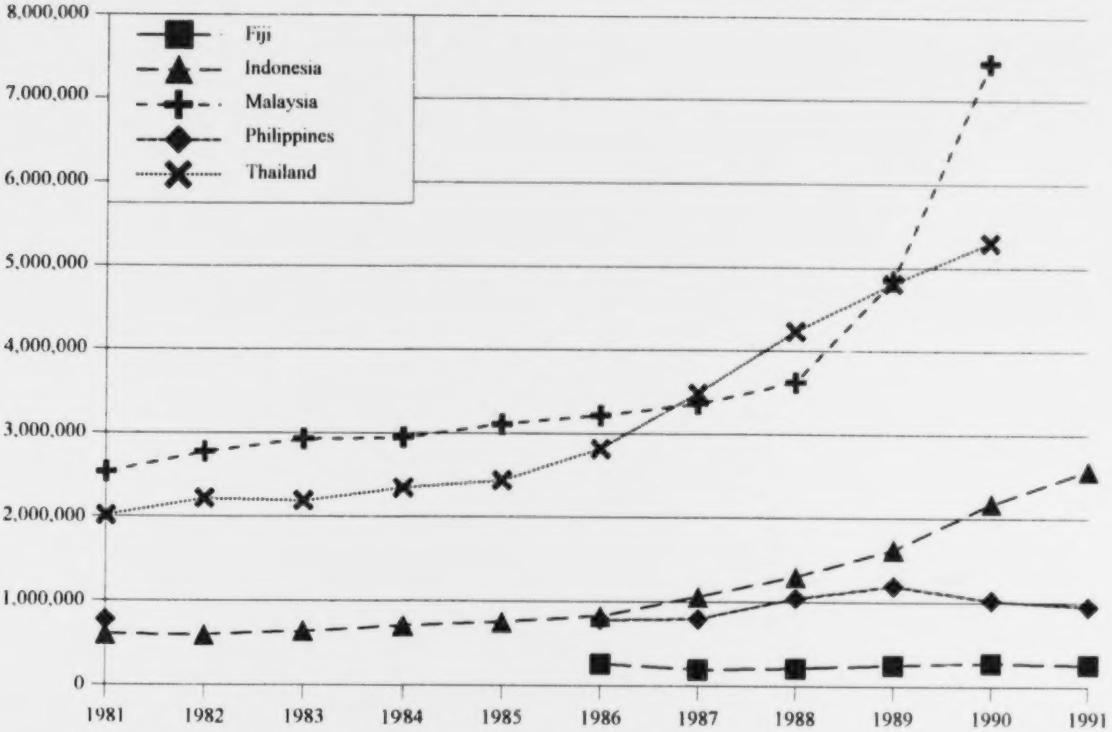
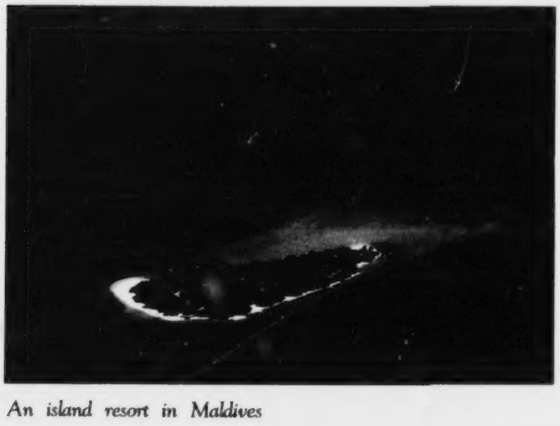
[3] Malaysia Tourism Promotion Board (1991), *Annual Tourism Statistical Report*, Kuala Lumpur.

Figure 1.3 Growth of international tourism in case-study countries 1981-1991



Note: Figures for Maldives were available only for two years as follows: 1980 (40,000) and 1991 (196,000).

tourism development in its National Economic Plans since 1970s. Today, the industry is the largest foreign exchange earner in the economy, ahead of sugar, garments, and gold and accounts for 12 per cent of GNP. Industry's growth has stimulated the local construction industry, creating enormous economic benefits and extra employment. The Ministry of Tourism in 1991 estimated that the tourism sector provides about 24,000 jobs through direct and indirect employment, which is 25 per cent of the total workforce. Overseas investors play a significant role in the industry, especially in major resorts.

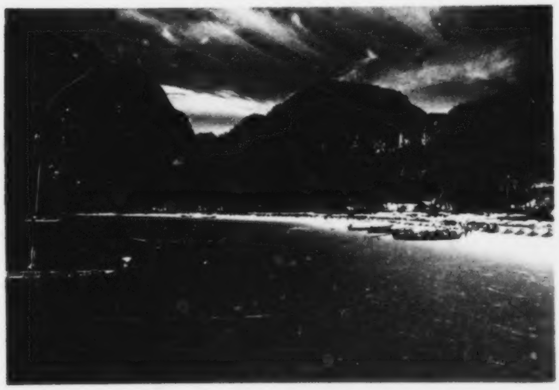


An island resort in Maldives

During the last decade, 1981-1991, Indonesia also experienced a very high average annual growth rate of 15 per cent in the tourism sector. However, in terms of number of tourist Indonesia still ranks third among ASEAN countries. It received around 2.5 million tourists in 1991. Tourism is the third biggest foreign currency earner in Indonesia after textiles garments and plywood. Data on daily average expenditure of tourists visiting Indonesia and their average length of stay indicate that foreign tourists stay longer in Indonesia as compared to other ASEAN countries, even though they spend less. However, there has been an increase over time in the per capita foreign exchange earnings from tourists in Indonesia.

Tourism has also contributed significantly to the Philippines economy in terms of receipts. Philippines received about one million tourists in 1991. The industry is among the top five foreign exchange earners since 1989. The Government of the Philippines has already identified tourism as a priority economic activity under the annual Investment Priorities Plan due to its contribution in the economic arena as a major foreign exchange earner. The growth of tourists arrivals has been projected to increase by an average annual growth rate of 4.4 per cent for the next few years with the expected arrival increasing to 1.7 million in 1996.

Phuket, Thailand: striving to retain its pristine nature



Palawan, Philippines: ideal for nature based tourism

In Maldives, on the average, tourism contributed 27 per cent of the central government revenue between 1985 and 1990. The industry was based on only one resort and about a thousand tourists in 1972. The number of tourists increased to 18,700 by 1977 and to 195,200 by 1990. Tourism in Maldives has benefitted from dispersed islands situation. An important feature of tourism in Maldives is that the resort islands are separated from islands inhabited by the local population. Most resort islands have their own supply of electricity, freshwater (desalination plants) incinerator and sewerage disposal system. Although per capita cost of these facilities are extremely high, it has allowed promotion of quality tourism with minimal damage to the natural environment and enabled to avoid cultural conflicts because the tourists have minimal contact with the indigenous population. The country case study of coastal tourism management in Maldives therefore offers many lessons in sustainable development of tourism for other countries, particularly small island developing states of Asia and the Pacific.

It is expected that the growth trend in the tourist traffic will continue to boost the economies in the region as more tourism resources are opened to the public, group air travel gets cheaper and package tours increase. The growth in tourism both foreign and domestic (box 1.1), will no doubt continue to contribute substantially to economic growth in the region. Nevertheless, it would also have a number of implication for the environment.

The awareness on the importance of environmental conservation in tourism development has increased lately. However, there is still a need, in practice, to (i) improve the environmental management of tourist facilities by introducing ways and means of abating and/or correcting damage that has already been incurred on the existing tourism resources and (ii) take effective actions in the development of new tourist resorts to prevent adverse impacts on the physical and ecological environment and to promote human use and quality of life values.

C. Tourism base in ESCAP region

Tourism in the ESCAP region can be classified into four categories, namely:

1.	City based tourism	where the tourists can enjoy sight-seeing, cuisine, shopping, recreation and urban amenities which are highly developed in cities such as Hong Kong, Tokyo, Singapore, Bangkok etc.
2.	Mountain based tourism	where the tourists enjoy cool climate, forest, scenic beauty and pleasant surroundings as in Genting Highlands of Malaysia, or Lake Tuba in Indonesia.
3.	Historic or cultural tourism	where the tourists can appreciate unique culture, lifestyle, art and history in the places such as Yogyakarta, Indonesia, or Chiang-Mai, Thailand.
4.	Seaside or coastal tourism	where tourist enjoy multiple facilities (both land and sea based) including sports, sight-seeing, shopping, entertainment etc.

With the current boom in coastal tourism new resorts are being developed every year in several countries of the region. The industry originally based solely on natural resources such as sandy beaches, clean sea, lovely surroundings etc., has transformed itself recently. A veriety of modern facilities has now been introduced in coastal areas to have a comfortable stay

Box 1.1 Domestic tourist boom demands a renewed focus on environmental surveillance

Coastal tourism has taken a new turn in recent years with a rapid increase of domestic tourists. Statistical surveys of domestic tourists in most countries of the region are not common. The current available data is therefore limited. However where available such data indicates boom in domestic tourism parallel to rapid growth in international tourism. A Thai study found that the number of domestic tourists travelling to various provinces in the nation was as high as 62 million of which 54 millions were Thai and 8 million were foreigners. In other words the number of domestic tourists was 7 times higher than the international visitors. It was further estimated that taking into consideration economic and population growth the number of domestic tourists would increase in future at the rate of 5 per cent per annum.

A more elaborate data set from Indonesia (see accompanying table) indicates average annual growth rate of 15 per cent in domestic tourism between 1987 and 1990. It also indicates that in contrast to foreign tourists, most of the domestic tourists stayed in moderately priced hotels (The statistics excluded a large number of domestic tourists who stayed with friends or relatives).

The increase in intensity of pressure from this type of tourism in coastal area is quite significant particularly in view of their concentration during weekends or local holidays. It is therefore extremely important that any planning for sustainable development of tourism in coastal areas must take into consideration the size, magnitude and catchment areas of domestic tourists and inter-relating these with the carrying capacity of the different ecosystems likely to be effected as a result of ensueing activities.

Size of domestic tourists in relation to hotel use of 1987-1992

Classification of hotels	1987	1988	1989	1990	1987-1990 average growth (per cent)
Five star	124,587	162,585	142,601	144,261	5.01
Four star	281,976	339,167	394,595	362,249	8.71
Three star	559,154	741,765	771,010	789,646	12.19
Two star	732,164	960,483	992,449	1,014,004	11.47
One star	612,294	936,326	1,050,971	1,206,768	25,38
Non-star	6,534,574	8,342,957	9,196,123	10,096,905	15.51
Total	8,844,749	11,483,283	12,547,749	13,586,833	15.38

Source: Central Bureau of Statistic, and Directorate General of Tourism, Indonesia.

and to enjoy diversified recreational activities. These man-made facilities have considerably enhanced the quality of tourism along sea shores in the region although at a great capital expense. Nusa Dua development in Bali, Indonesia is an example of the case.

The investments in improving the quality of coastal tourism are playing a dominate role in new resort developments in the region. It partly explains why a fairly large number of seaside resorts are developing in South-East Asia. In contrast apparent lack of same growth in Pacific islands such as Guam, Saipan, the Republic of Palau (where similar natural conditions for

Bali, Indonesia: an area of great cultural attraction seaside resorts are abundant) can be explained in their sluggish economies and lack of capital investments.

Among the countries selected for the case-study Maldives is totally dependent on nature-based coastal tourism. "Historical or cultural attractions are almost non existent in Maldives". Similarly Fiji, Indonesia and Philippines, rely heavily on nature-based coastal tourism. Tourism in Malaysia and Thailand is also largely coastal oriented although other types of tourism have also gained ground. Major coastal tourist destinations in these countries are given in table 1.1.

D. Coastal tourism-related activities and facilities

Tourism is a multi-faceted activity involving relationships and phenomenon arising out of the journeys and temporary sojourns of people travelling primarily for leisure or recreational purposes. A wide range of coastal tourist activities can be found in the ESCAP region. Roughly speaking, these activities can be classified into two types.

1. Nature-based activities — Fishing, sun-bathing, swim ming, sight-seeing, snorkeling, scuba-diving, etc.
2. Man-made activities — Shopping, entertainment, etc.

In spite of increase in man-made facilities, the main activities of coastal tourism in the region are still nature-based. The man-made activities occur along beaches or in the hinterland. Generally, the more popular and developed the beach destinations are, the less important and dependent on the nature-based activities they are. Activities of tourists on the uninhabited resort island of Maldives are totally nature-based while in mature resorts such as Pattaya (Thailand) they are based more on city amenities or man-made facilities.

Currently, the potential development of the coastal tourism industry relies heavily on the availability and adequate provision of recreational and support facilities. Moreover service sector facilities, public utilities and amenities as well as the infrastructure forms integral part of activities associated with the promotion of tourism. Figure 1.4 summarizes major components of tourist facilities. It is to be noted that among the facilities described under the group public utilities and amenities and associated infrastructure are those which are established essentially to support tourism development. While others are primarily of commercial nature — that are developed for financial return. All these tourism related activities whether commercially-based or otherwise may have critical impacts on the environment through consumption of resources or generation of wastes.

Coastal tourism development include both consumptive and non-consumptive tourist activities. Consumptive activities involve the consumption of local products and seafood in significant quantities, and may result in overfishing and eventually lead to depletion of species, as for example, has happened in the case of turtle population in Maldives. Turtles were caught there for preparing ornaments which are sold in souvenir shops. Non-consumptive activities vary from underwater photography to surface water contact activities and their impacts vary accordingly. Reef-walking and boating are such type of activities which have caused extensive damage to the coral reefs that serve a host of species and varieties of marine resources. The majority of tourist activities, whether consumptive or non-consumptive, can have significant environmental effects (mostly negative) on the physical, ecological and social/cultural resources and it is therefore essential

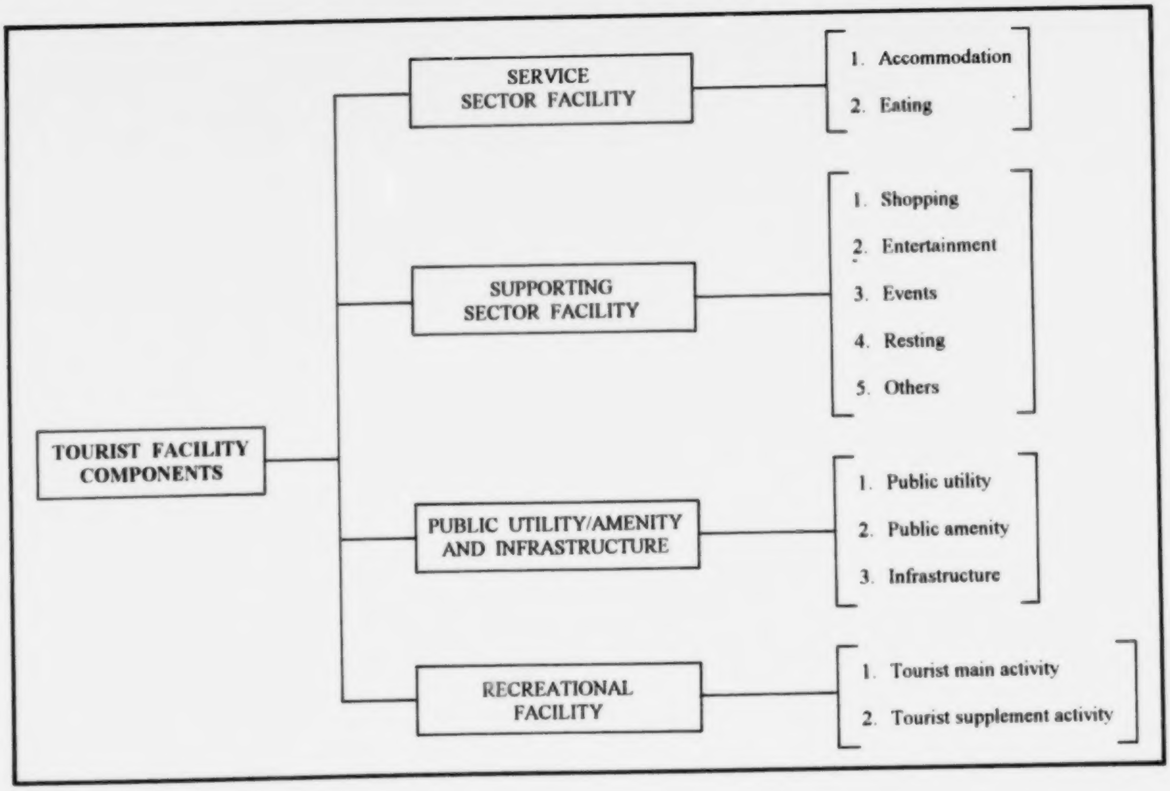
Diving: an attractive sport in Asian coastal zone

A glimpse of varied tourist activities in coastal zones

Table 1.1 Major Tourist Destinations in Coastal Areas of selected countries in ESCAP region

Country	Place	Type	Remarks
Malaysia	Langkawi	Seaside resort	Beach. Cuisine. Legend. Nature
	Penang Island	Seaside resort	Beach, Marine Sports facilities, Botanical garden. Temples
	Port Dickson	Seaside resort	Beach
	Tanjung Jara	Seaside resort	Beach (under development)
	Cherating Beach	Seaside resort	Mediterranean Club
	Malacca	Seaside resort	Beach, Heritage.
	Kuantan	Seaside resort	Beach
	Tioman Island	Seaside resort	Beach
	Pangkor	–do–	–do–
	Dasaru	Seaside resort	
Fiji	Coral Coast (Viti Levu)	Small scale seaside resort	Beach, Natural beauties, Shopping
	Nadi (Viti Levu)	Small scale seaside resort	Stop over, short holiday
	Pacific Harbour (Viti Levu)	Large scale resort (under development)	Beach, Shopping centre, Sport facilities
	Denarau Island	Large scale resort (under development)	Beach, Shopping centre, Sport facilities
	Mamanuca Group	Seaside small scale resort	Natural beauties, Beach
Thailand	Pattaya	Seaside resort	Beach, Marine sports, Cuisine
	Hua Hin–Cha–am	Seaside resort	Beach, Marine sports
	Samui Island	Seaside resort	Beach, Marine sports
	Phuket Island	Seaside resort	Beach, Marine sports
Philippines	Puerto Azul	Seaside resort	Sports facilities (on shore)
	Punta Baluarte	Seaside resort	Sports facilities (on and offshore)
	El Nido	Seaside resort	Marine sports facilities
	Cebu	Seaside resort	Beach, Marine sports facilities
Indonesia	Bali	Seaside resort	International seaside resorts rich in diversified recreational activities
	Pelabuhan Ratu	Seaside resort	Beach, Cuisine
	Pangandaran	Seaside resort	Beach, Natural beauty
	Sulaweri Island	Seaside resort	Beach, Marine sports, Coral gardens
Maldives	Mali Atoll	Small island resort	Good accommodation, Diving facilities
	Ari Atoll	Small island resort	Good accommodation, Diving facilities, Natural beauty
	Eddipolu Atoll	Small island resort	Good accommodation, Diving facilities, Natural beauty
	Malosmadulu South Atoll	Small island resort	Good accommodation, Diving facilities, Natural beauty
	Felidu Atoll	Small island resort	Good accommodation, Diving facilities, Natural beauty
	Vaavu Atoll	Small island resort	Good accommodation, Diving facilities, Natural beauty

Figure 1.4 Typical tourist facility components


TOURIST FACILITY COMPONENTS
SERVICE SECTOR FACILITY
1. Accommodation
2. Eating
SUPPORTING SECTOR FACILITY
1. Shopping
2. Entertainment
3. Events
4. Resting
5. Others
PUBLIC UTILITY/AMENITY AND INFRASTRUCTURE
1. Public utility
2. Public amenity
3. Infrastructure
RECREATIONAL FACILITY
1. Tourist main activity
2. Tourist supplement activity

to give full consideration to these in coastal tourism development planning.

Golf: a booming tourist activities in coastal zones

E. Components of coastal environment

The coastal zone is a place of rapid transition from terrestrial to marine influences. Tides and surf entering freshwater streams and shallow waters make this environment one of constantly fluctuating conditions, and many organisms living here survive at the extremes of their range of tolerance. Additional stress in this situation from tourism development activities can have particularly severe effects. The geographical feature of coastal zone can be delineated into six major coastal resource units described below:

(i) ***Delta and estuaries*** are highly productive because of the nutrients brought in by freshwater and its mixing with marine waters. The dynamics of the changing shape and size of these ecosystems can be affected by inappropriate siting and uncontrolled construction and operation of tourism development projects at or adjacent to deltas and estuaries.

Coral reef: an invaluable asset for tourism

Seagrass meadows: A fragile ecosystem needing protection

Mangroves: an ecosystem threatened by tourism

(ii) ***Mangrove forests*** are highly productive because of their ability to live on shallow marine flats, trap sunlight, and produce energy in the form of leaf litter that supports the remainder of the system. The trees also trap nutrient-rich terrigenous sediments and offer diverse shelter and habitat to many birds, fish, and shellfish. The dynamics of these ecosystems are affected by the clearing and reclamation of mangroves for the construction of shore-based tourism-related facilities such as marinas and boat yards and by the discharge of pollutants (liquid and solid wastes) from tourism-related establishments and facilities.

(iii) ***Other wetlands*** Tidal swamp forests are less widely distributed than mangrove forests, but most often occur inland of mangrove forests where coastal waters are subject to tidal fluctuations but are essentially fresh (nonmarine or brackish). Tidal swamp forests are highly productive for reasons similar to mangrove forests: ability to grow in coastal waters, trapping sunlight and producing leaf fall and shelter for the rest of the ecosystem.

(iv) ***Seagrass meadows*** are common on shallow, exposed platforms, especially on the middle and back zones of reef flats, seaward of the mangrove forests and landward of the outer coral dominated edge of the reef. Seagrass meadows are highly productive owing to the rapid growth of the grasses in bright sunlight and shallow water, and export considerable productivity in the form of detached or decayed grass "blades" *(thali)* and fin and shellfish. The dynamics of the seagrass meadow are affected by excessive discharge of sediments associated with the uncontrolled construction of tourism facilities and infrastructures which result in the burial or conversion of the meadows to sand or mud flats. In addition, the presence of sediments can cause turbidity of water which limits the penetration of light and affects the growth rate of the seagrasses. Pollutants discharged from tourist establishments also cause the decline of seagrasses.

(v) ***White sand beaches*** are commonly distributed throughout the tropics wherever there are reefs, sand flats, or seagrass meadows offshore that provide the sources of calcareous sand. Less common are red, black, and green sand beaches derived from the breakdown of volcanic rock. White sand is produced from the physical and biological production and erosion of carbonate skeletal remains of corals, molluscs, sea urchins and other echinoderms, sea cucumbers, foraminifera, crustose coralline, red algae, and sand producing green algae. Sandy beaches are dynamic and constantly changing height, width, and slope because of the effects of wind, waves, water currents, tides, storms, and seasonal changes that suspend, move, and settle out sand particles. Sand beaches are a part of larger systems called "cells," which include sand bars and dunes to landward and offshore sand reservoirs to seaward side. Beaches often change their profile in response to seasonal changes in the factors that transport sand up or down the coast or transport sand farther onshore or offshore. The dynamics of beach systems are affected by:

(a) Interruption in the replenishment of beach sand from offshore updrift sources owing to shoreline tourism development structures, dredging, and provision of navigation channels to enhance recreational purposes.

(b) Mining of beach sand or mining of offshore sand reservoirs (that replenish beaches) for construction of hotels, marinas, etc.

(c) Modification of riverine discharges such as construction of jetties to support tourism activities (boating, etc).

(vi) ***Coral reef*** communities normally dominate the outer edge and slopes of shallow tropical reef platforms and also form the dominant habitat in most barrier reef or atoll reef lagoons. The upward growth of coral communities over the thousands of years since the last Ice Age has created the shallow coastal platforms surrounding many tropical islands, providing the foundation for many other ecosystems, including mangrove forests, tidal swamp forests, seagrass meadow, and the source of sand and stability for beaches. Coral islands, shoals, and cays also form atop shallow reefs from the skeletal remains of coral reef organisms, and the mass of many higher islands and continental lands are composed of the remains. The physical presence of offshore reefs protects islands and shorelines from wave attack, typhoons, cyclones and erosion. The dominant organisms within coral reef communities are reef corals that contribute much of the bulk or "building blocks" to other calcareous organisms (molluscs, echinoderms) to form the rigid reef structure. The ability of coral communities to grow and sustain highly productive ecosystems in nutrient-low environments and to build rigid structures in the face of persistent wave action has allowed them to dominate environments unsuitable for other communities/ecosystems. The dynamics of coral reefs are affected by:

(a) Excessive terrigenous sedimentation that buries corals an other bottom-dwelling reef organisms, discharged from the landward tourism development activities. The presence of sediments also reduces the amount of sunlight penetration, thus decreasing the primary production.

(b) Tourism activities such as underwater tourism, reef-walking and resting commercial coral reef collection, boat anchorage, and others cause extensive damage to coral reefs.

(c) Excessive pollutant (liquid and solid waste) discharged from tourist establishments and hydrocarbons released from tourist activities such as boating, ferries, water motor-biking, and others may cause the depletion and death of coral reefs.

(vii) ***Small islands*** a number of uninhabited small islands, cays and atolls exist which have great scenic and aesthetic value for tourism and may also constitute a treasure of biological diversity. The dynamics of these island ecosystems can be seriously affected by human activities including those emanating from tourism.

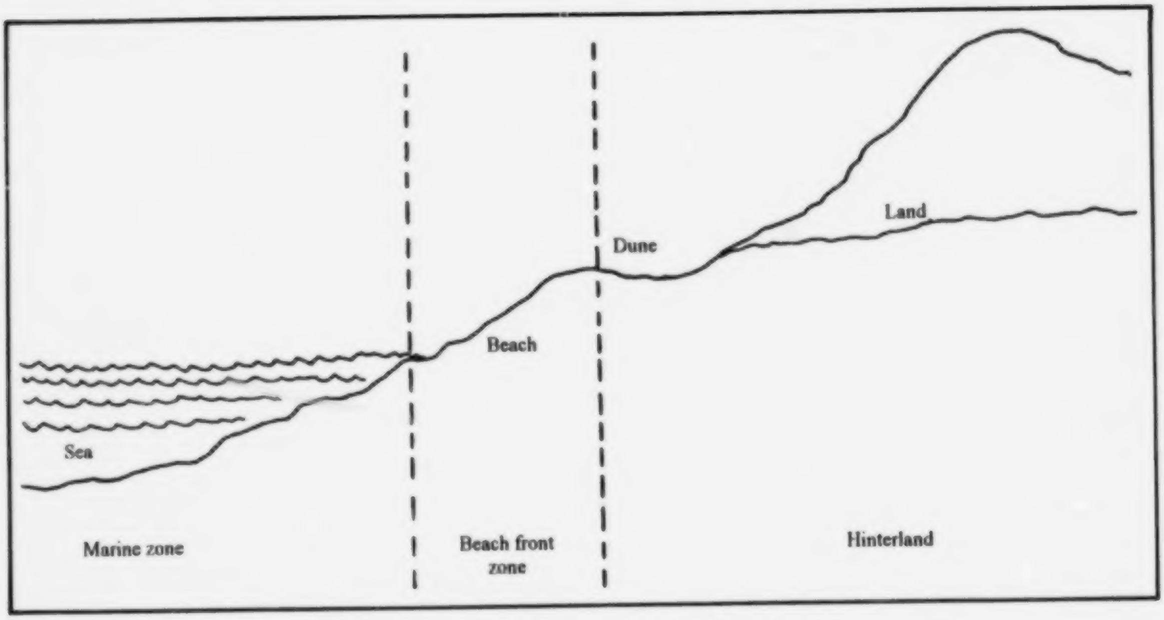
F. Relationship between tourism activities and coastal environment

A detailed breakdown of nature based and man made tourism activities has been given in table 1.2 relating these to the various zones in coastal environment (figure 1.5). It can be seen that tourism based activities affect each zone in the coastal environment and are not only confined to the narrow strip of shoreline but expand further up to the terrestrial hinterland and further down to the ocean.

Table 1.2 Coastal tourism activities and facilities commonly observed in the ESCAP region

Zone	Activities		Facilities/services				
	Nature-based	Man-made	Accommodation	Eating places	Supporting facilities	Public utilities/amenities	Associated infrastructure
Hinterland	- Sight-seeing - Trekking - Nature-studying - Camping - Bird-watching - Bicycling - Others	- Shopping - Dining - Disco-theque - Entertainment - Bars - Sporting - Others	- Bungalow - Hotel - Guest-house - Resort - Condominiums - Hostels - Community complex - Others	- Local shops - Hawker - Restaurant - International cuisine - Bar - Coffeeshop - Others	- Shopping complex - Souvenir shops - Entertainment places - Diving shops - Tour/travel agent - Rental shops	- Water supply - Sanitation - Solid waste disposal - Electricity - Telecommunication - Road - Public transport - Others	- Drainage - Road - Airport - Railroad - Others
Beach front/dune	- Reading - Sun-bathing - Nature-studying - Picnic - Swimming - Parasailing - Yachting - Scootering - Windsurfing - Camping - Other angling	- Sporting	- Low-rise bungalow	- Kiosk - Local shop - Hawker - Refreshment booth	- Bicycle - Motor-cycle - Play ground - Hore-riding	- Shower stand - Parking lot - Rescue tower - Marina	- Pier - Harbour
Marine	- Snorkeling - Scuba diving - Fishing - Cruising - Sight-seeing - Others						

Figure 1.5 Schematic drawing showing coastal zones related to tourism development


Dune
Land
Beach
Sea
Marine zone
Beach front zone
Hinterland

II. ENVIRONMENTAL IMPACTS OF COASTAL TOURISM DEVELOPMENT

A high-quality environment is essential for the promotion of coastal tourism in the Asian and Pacific region. However, the quality of the coastal environment is under a constant threat by the growth and development within the tourism sector itself. This is because economic objective of the tourism industry often runs counter to coastal environmental considerations. Owing to this paradoxical situation in broad scenario, there are three options:

- (i) To continue promoting such economic activities and, in so doing, to accept a certain degree of coastal environmental deterioration; or
- (ii) To give priority to coastal environmental conservation and forfeit most of the potential income from tourism;
- (iii) To follow a middle path between "tourism growth" and "environmental conservation," with trade offs calling for careful choices detrimental to neither.

The third option is obviously the best choice to promote the tourist industry from a qualitative as well as quantitative standpoint. The option calls for assessment of trade offs. This, however, can be done only with a detailed knowledge of the environmental impacts of coastal tourism activities. The objective of this chapter is to examine tourism development impacts, whether, direct or indirect on the coastal environment and provide a detailed check-list of the same.

A. Impact type and extent

Similar to other categories of tourism, coastal tourism, renders both positive and negative consequences. Certainly it has provided benefits to tourists, indigenous communities and nations, but it has also created adverse impacts on coastal resources. Some of these positive and negative impacts of coastal tourism relating to the tourists and indigenous communities have been summed up in table below:

Wanton disposal of sewage in a tourist resort

Initiatives and activities, in coastal tourism sector are carried out by a number of actors including government agencies, the private investors or developers, the tourists themselves, or by all, and the net result is both short-term and long-term impacts on environmental resources. The short-term impacts are basically associated with the construction phase of projects such as construction of hotel or resort buildings, provision of public utilities or development of infrastructure. The long-term effects are generally associated with the operation and maintenance of tourism development components and sustaining tourist recreational of activities. Many of these can impact either directly or indirectly on the coastal environmental parameters.

A typical example of both short and long term impacts on the environment is the promotion of golf tourism in the Asian and Pacific region which has led to massive growth in construction of golf courses particularly in coastal areas Thailand took the early initiative. Nearly half a million golfers, one-fifth of whom are expatriates and foreign tourists, now regularly use Thailand's golf courses. 120 courses were in operation by the end of 1992 which increased to 160 by the end of 1993. Golf tourism in Thailand

Table 2.1 Positive and negative impacts of tourism on tourist and indigenous communities

Impact	Tourists	Indigenous communities
Positive	Opportunity for leisure and enhancement of knowledge	Creation of improved facilities and infrastructure; economic benefits; conservation of natural and cultural resources
	Encountering exotic experiences	
Negative	Dissatisfaction with respect to their expectations	Over-straining facilities and infrastructure; socio-economic unrest; damage to the cultural traditions and natural environment

today is targeted to various countries. Travel agencies, hotel chains, airlines and other tourism multinationals are increasingly selling the country as a cheap golfing destination, so that it looks set to become the centre of Asian golf tourism over the next few years. The golf course and tourism lobby claims that Thailand needs at least 300 courses to cope with the expected demand. Other Asian countries are also trying to follow the example of golf tourism in Thailand.[1] For example the Ministry of Tourism in Malaysia aims to attract 18 million visitors a year in the next decade. Golf courses and beach resorts are central to this strategy. The country has over 75 golf courses, and another 125 are planned by the year 2000.[2]

The zeal to build golf courses is adding to the negative social, cultural and environmental impacts of mass commercial tourism, particularly in coastal areas of developing countries. Forests are cut down; water resources depleted; and air, water and soil polluted by the excessive use of chemicals. Local people are deprived of their rights to the resources such as land on which they depend for survival as their communities are disrupted.

The example of golf tourism shows that the impact of an activity may not remain limited to the coastal zone where the activity is being conducted. Agrochemical run off from golf courses or waste water discharged from tourists and their activities, though being carried out on the terrestrial zone, may affect not only the environment of the terrestrial zone but also the beach front and marine water. Some activities, however, may affect only the environment of the zone in which they are carried out. For example, anchor damages on coral reefs caused by diving and tourist boats occur only in the marine zone. However in the long run, if those damages are not reduced and avoided, the impacts are likely to expand to other zones and will be felt by everyone concerned in the coastal tourism industry.

B. Impacts by component of coastal environment

The following account gives some of the prominent impacts of tourism development on the coastal environment which have been categorized into four groups:

(1) Impacts on physical environment;

(2) Impacts on ecological environment;

(3) Impacts on human-use values;

(4) Impacts on quality-of-life values.

(1) Physical environment

Some of the obvious impacts of tourism-related activities on physical environment of the coast include soil erosion, landslide, water quality degradation, coastline changes, etc.

(a) Soil erosion

Some large-scale tourism development projects, e.g. hotel or resort construction, associated infrastructure provision e.g. road construction, etc. particularly those requiring heavy vertical structures; entail extensive clearing of vegetation and trees; digging and filling of land for the foundation, seers and underground utility trenches; and landscaping, have a great impact on soil.

Site preparation activities such as clearing, grubbing, grading, demolition, and dredging; as well as construction activities such as placement of structures, installation of utilities, laying out circulation system, landscaping and fencing; may cause higher soil erosion hazard, reduce fertility and water holding capacity and change the soil consistency, density and compaction.

The soil erosion which takes place on the terrestrial zone may lead to stream or water source blockage as well as increased siltation and sedimentation of river and sea water. Increased suspended solid concentration of the sea water may eventually kill corals and disrupt food chains in aquatic ecosystems in both the beach front and marine zones.

(b) Landslide

Site preparation activities as well as construction activities described above may result in modified land-

Raising of inappropriate coastal structure often undercuts coastlines scape, altered soil profile, altered topography and altered drainage characteristics leading to higher landslide potential, especially in areas with steep slopes and sparse vegetation.

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[1] Pleumarom A. (1992), "Course and Effect Golf Tourism in Thailand" *The Ecologist* Vol. 22 No. 3, May/June 1992.

[2] Sexton Sarah; Asia "in the Bunker", *The Ecologist* Vol. 22 No. 3 May/June 1992.

(c) Water quality degradation

Coastal areas, when compared with inland or forested areas, have a rather fragile ecological system. The coastal soils because of a high mixture of sand, tend to have a rather good drainage but poor filtering capability. When the number of coastal tourist and visitors soar rapidly, the soils capability to absorb naturally the polluted waste water cannot shoulder the burden. Consequently, the waste and polluted water is drained and discharged directly into the sea leading to water quality degradation, sea pollution and many other related negative impacts including disturbed marine ecological balance, coral reef degradation, mangrove depletion etc.

During a tourism boom, add on extensions to hotels and other buildings, result in problems of wastewater disposal, as the increased sewage load after these extensions cannot be effectively accommodated in the limited available capacities. As a result, inadequately treated wastewater and sewage are discharged to the sea resulting in gross contamination of marine waters.

Pattaya in Thailand is a typical case of water quality degradation due to rapid growth of tourism without adequate water treatment system and enforcement. Improper disposal of solid and liquid wastes caused elevated faecal coliform levels, eutrophication of coastal waters and has increased the probability of the "red tide" phenomenon. Heavy use of sea transport for sightseeing by tourists has also been noticed to aggravate the contamination of water quality due to discharge of hydrocarbons.

In Maldives, sewage disposal remains a problem in small islands because the treatment plants cannot be accommodated in the limited available area. Initial disposal of sewage was through soakpits which often resulted in contamination of the ground water. In Bali, Indonesia, poor treatments of waste around tourist resorts have affected water quality of the beach. Around Sanur Kua and Nusa Dua, CODcr. has reached 6 mg/l, and in some other parts as high as 8 mg/l. By international standards this is much higher than the safe limit for swimming or other recreation. Japan, for example, uses 2 ml/l CODmn, or the same with 4 mg/l CODcr as its upper limit for safety.

(d) Coastline changes

Erosion poses one of the greatest threats to coastal environment. The causes of erosion can be natural or man-made; however, the latter causes more damaging effects to the fragile coastal system. Unplanned tourism development has resulted in building and development of infrastructure too close to the shoreline exacerbating erosion and necessitating the construction of protective structures. The construction of such protective structures has often affected the coastal dynamics and led to further erosion of the existing beaches in Fiji, Indonesia and Maldives and prevented future beach formation in many other countries of the region.

Structure that enhances the erosion process along coasts

Many resorts islands in the small island developing states such as Maldives and Fiji have sequential built-up of sediments produced by the growing reefs. The sediments on these islands are therefore entirely biological in origin. The waves and currents help to shape the islands from season to season and in fact there is very marked seasonal movement of sediment around most of the islands. Tourism development on these islands necessitated the need to build the necessary infrastructure and in many cases readjustments caused erosion and gradual displacement of sediments from the beach to the sea. A continuity of the process can result in severe degradation or even loss of the beach with serious impacts on the tourism.

Helipad improves access but may enhance coastal erosion

Construction of solid causeways and groynes on such dynamic beaches, in addition to the loss in aesthetic qualities, have shown to have a severe impact on the beach process. In few cases where long solid jetties have been constructed in Maldives constant loss of sediment off the reef is evident. It would probably be possible to arrest the erosion with groynes but only if the groynes were built all around the islands. This would no doubt affect the aesthetic quality of the resort and hence the tourism.

Coral sand is exploited from the marine environment and used as aggregate in building and construction of resorts. The activity can seriously impede ecological processes and beach dynamics. The coral sand of biological origin comes from reef, algae parts of molluscs, and crustaceans and other small organisms which help in shaping the beaches and islands. Their removal therefore often results in adverse environmental impacts.

In Malaysia, coastal erosion is a serious problem affecting every state of the country. The National Coastal Erosion Study (1985) showed that the 4,809 km of shore line in Malaysia, about 1,390 km (27 per cent) are presently subjected to erosion with varying degree of severity. In some areas the average rate of shoreline retreat ranges from less than 1 m to more than 10 m per year. Along 132 km of shore, coastal erosion seriously threatens important facilities. This zone has been designated as critical erosion area. Another 236 km of Malaysian shoreline has experienced significant erosion. Along this stretch erosion may seriously threaten important facilities in the foreseeable future. The acceptable coastal erosion area stretches for 962 km. In general erosion in this area does not pose a serious economic threat.

In Fiji, some resorts are built too close to the shoreline. Moreover, in a misguided attempt to 'deal with' coastal problems high cost sea walls and groynes have been constructed, which not only fail to resist the forces of the sea in storm conditions but even under calmer prevailing conditions result in loss of beaches, one of the main attractions for tourists. It is therefore imperative to consider the current rush to build resorts on every small island very carefully. The recent history of Makaluva is testimony to this. In the 1940s a government quarantine facility was built on the island — today that facility is underwater, about 100 m offshore. The island has shrunk in size due to erosion.

Every major resort in Fiji has 'coastal process' problems, some of them such as those at Denarau are very severe. Resort developers should realize that tropical coastlines which are subject to trade winds and cyclones are dynamic and they need to plan for this.

(e) Wastes and garbage pollution

Disposal of solid waste and sewerage effluent is an issue of obvious concern in tropical coastal environments where detrimental effects on the environment and, in turn, the development can result if inappropriate methods are used.

As the number of tourists visiting a beach resort or island increases, the quantity of garbages and wastes — be it plastic bags, glass and plastic bottles, aluminum cans, foam containers, discarded litters and many other unexpected items — piles up there accordingly. The wastes come with the tourists, but they never go with them. It is a paradox that the famous resorts under jurisdiction of the municipality or local administration which often have personnel to collect the garbage lack in dumping ground and proper disposal system whereas the remote beaches and islands which have land for disposal are grossly deficient in personnel for garbage collection. Both are facing the problem of inadequate garbage disposal and the discarded waste is littering the beaches, downgrading the sea-side beauty, and polluting the seas. Drinking water bottles, both plastic and glass, are accumulating day by day. Styrofoam containers and plastic bags can be found on the beach and in the sea as the irresponsible tourists discard them.

Oil pollution from tourist boats in Pattaya, Thailand

With tourism, a change in the quantity and the nature of garbage has also been observed from biodegradable to non-biodegradable wastes. Increased imports of such items as canned drinks or disposable goods has enhanced the amount and nature of garbage substantially. In Maldives, for example, the amount of plastics, glass and foams in the garbage has considerably increased in recent years, which has created the problem of environmentally sound disposal of garbage.

(2) Ecological environment

Ecology of coastal environment is very fragile and easily vulnerable for disruption. While coastal zone has to shoulder high pressure and burden from increased activities in other sectors of the economy, tourism itself is adding stress on its ecological balance. Impacts on ecological environment include coral reef damages, loss of mangrove forest, depletion of marine lives, drying up or contamination of underground water etc.

(a) Coral reef damages

Coral reef form one of the primary tourist attractions in coastal regions. However, the absence of definite strategies to ensure the conservation of reefs has already led to the depletion and degradation of these resources in many parts of the ESCAP region. There are instances where tourists and locals are found walking on reefs, damaging them extensively. Similarly, the collection of pieces of coral as souvenirs, collection of shells, dropping of anchors of boats used by tourists and fishermen, are also contributory causes. Recently, the collection of exotic fish for export has also led to the damaging of reef food chains and contributed to the ecocide of reefs.

Apart from fishing activities, the corals are also exploited and damaged, either intentionally or out of ignorance, by other tourism related activities. The coral colonies situated close to popular beach resorts have been most seriously affected and been subjected to serious damages. These are facing various problems ranging from polluted sea water, disturbance from tourist divers (unskilled), oil-spill from too many diving boats, and waste littering. Even the more off-shore and less accessible coral reefs are facing damages, from some of these factors, though to a lesser extent. However, the tendency of damages is increasing as the tourism activity of scuba diving and snorkeling are gaining popularity.

Coastal water pollution currently affects over 60 per cent of Thailand's coral reefs and is rapidly becoming the predominant long-term threat to reef health. Of primary concern are impacts associated with sedimentation and wastewater discharges. Sedimentation is a problem for 51 per cent of Thailand's coral reefs and is the predominant cause of damage in 14 per cent of the reefs. Provinces where sedimentation is a significant problem include Chonburi (reefs in the Pattaya area), Surathani (Ang Thong group), Phuket (Patong Bay, Bang Tao and Ko Hae) and Prachuap Kirikhan. Sedimentation threatens most reefs located in shallow inshore waters close to mainland developments.

Unscrupulous release of sewage in tourist resort

Tourist boat anchoring can damage coral reef

The ecological effects of sedimentation on coral reefs range from a temporary slow-down in coral growth to gradual dying and permanent changes in community structure and species diversity. Persistent sedimentation can reduce the potential of reefs for both recreation and fisheries. The most severe sedimentation problems are associated with extensive removal of vegetation and construction on coastal watersheds. Formerly, sedimentation was primarily associated with clearing for agriculture. More recently, increased semidentation is most often linked to tourism related projects involving cut and fill operations for road construction, quarrying for fill material, gullying along steep roads, and filling of lowland areas. Such activities increase sediment discharges into shallow coastal waters, resulting in higher turbidity. The extent of reef sedimentation is affected by currents; hence the actual source of land-based sediment pollution may be several kilometres from the affected reefs.

Pollution associated with excessive wastewater discharges in coastal waters is a cause of damage of 10 per cent of Thailand's coral reefs. It is an important cause of damage in such resorts as Pattaya, Ko Samet, Phi Phi Don and Patong Bay. In these locations, beach resorts and seaside communities are discharging wastewater directly into coastal bays in amounts that exceed the natural dilution capacity of coastal waters. Wastewater pollution can cause eutrophication — excessive algal growth, reduce oxygen levels, and increased turbidities — which in time reduce coral

Degraded corals in Koh Samed, Thailand

growth and lead to the decline of species. Eutrophication of reefs reduces their tourism and recreational potential and if severe, can also cause a public health threat for water-based sports.

In Maldives, impacts on the reefs are visible but the degree of impact differs from resort. Diving associated damage to the reefs, for example, vary depending on the awareness level of both the resort management and the dive masters. Most diving associated damage to the reefs can be attributed to beginners and other non professional divers.

Improper garbage disposal has also caused reef damage and degradation of the coastal areas in Maldives capital, Male, virtualy killing the reefs. Plastics and cans tend to cause the biggest problem as their disposal remains difficult.

Sedimentation resulting from hotel construction boom in the 1970s in Fiji resulted in heavy sediment runoff which killed many nearshore coral colonies on the south coast of Viti Levu. The coral reef damages have also been reported in Indonesia, Philippines and Malaysia.

Tourism can result in over-exploitation of seafood

Biodiversity: an asset needing protection from the onslaught of tourism

(b) Loss of mangrove forest

Mangroves constitute an important component of marine life support system. Mangrove forest is a buffer zone delineating the inland ecological system and the sea. It is sanctuary for numerous kinds of sea animals, shrimps, crabs, to lay eggs and to breed. Tourism development projects involving the reclamation of mangrove areas for construction have therefore had adverse ecological impacts. It is reported that the mangrove forests in Thailand, Fiji, and Philippines are shrinking because of encroachments. In several cases, the areas which used to be mangrove forest were destroyed and developed into commercial sites to provide shopping goods for growing tourist traffic. Mangroves are also being removed to meet energy needs and for shrimp farming to provide food to tourists.

In Fiji, resort construction has resulted in significant loss of mangroves leading to depletion of fisheries due to loss of habitat. Although traditional fishing rights owners have been financially compensated since 1974 for loss of fishing resources, the adequacy of such an approach over the long term remains questionable.

(c) Depletion of marine lives

The coastal tourism development induces higher number of people to move and concentrate into the coastal zone. Consequently, higher demand for marine resources are inevitable, which leads to increased exploitation, and in some cases depletion, of marine lives. Exploitation of living resources such as fish lobsters and coral for the industry continue in almost all the case-study countries. In Maldives, the most significant effect was felt on the turtle population which were exploited for decorative and ornamental items, including jewellery. However extensive mining of corals, which were used for the construction of the resorts earlier, has stopped. Its use in the tourist industry today is almost negligible due to strict government regulation.

With the increase in tourism, and growth of souvenir trade reef resources such as coarl, black coral, shells and other organisms have been exploited for making ornaments.

(3) Human-use values

Environmental implications of tourism-related activities also concern human-use values. Some obvious impacts have been recorded on water supply, public beach access, land use, landscape, and loss of shoreline's beauty etc.

(a) Water supply

Uncontrolled coastal tourism development can add substantial stress on water supply capacity. Lack of potable water is a common phenomenon in many coastal resorts. The increase in demand leading to excessive withdrawals may result in depletion of aquifers and land subsidence. Large-scale tourism projects may also cause a decrease in available water for local residents if the supply system is hooked up to a single source or aquifer. Further, over-extraction of ground and river water may upset the water balance of the coast and cause saline water intrusion or incursion. It may also result in contamination due to leeching from land-fills. Such impacts have been observed in several case-study countries.

(b) Power supply

A coastal village or small town which is inhabited by a certain number of people usually will be provided with limited capacity of power supply which is enough for agriculture-based demand, and daily use. An uncontrolled or over-growth of tourism may increase power demand and if the system is over stretched it can cause frequent power failures.

(c) Public beach access

Usually, the prime beach area in every coastal resort is the main target for tourism development. The resort owners try to occupy the best plot of land and fence off their boundaries in order to create an exclusive beautiful private beach for their guests, without providing public access to these beaches. Such inaccessibility to beach for public is a common phenomenon in Fiji, Philippines, Thailand, and Indonesia.

Hotel raised without regard to landscape considerations

(d) Land use

Once the tourism is introduced into the rural coastal areas or villages, the settlement grow rapidly into urban areas and the need for land use planning and control emanates. If is does not take place unhealthy growth of human settlements takes place with conflicting activities and unbalanced land-use. The spread of residential areas for tourists along the coast in nonconformity with the local planning requirements sometimes adds serious social problems as well as increasing ecological and landscape pressures in Asia and the Pacific. Further tourism development in the region has also resulted in the conversion of mangrove areas into fish ponds, and tidal flats or marshes into commercial sites, displacing small fishing community or local residents dependent on those lands for livelihood.

(e) Landscape

Uncontrolled urban development in the coastal town may also lead to visual pollution, unaesthetic values and non-compatible architecture. Similarly, over-crowded beach resorts may lead to degraded landscape values and scenic beauty. Installation of modern tourist-related facilities and infrastructure often leads to aesthetic degradation of the landscape or sites — the style and architecture of such new installations are often not compatible or in harmony or on a scale with the traditional buildings; moreover, tourist facility development is often disorderly and scattered, giving the landscape a "moth-eaten"look. In addition, the establishment of housing facilities and infrastructure for tourists inevitably encroaches on previous open spaces, i.e., on natural landscape and agricultural and pastoral lands.

(f) Loss of shoreline's beauty

In general, the landuse and building control in various countries in the ESCAP region are quite weak when compared with developed western countries. Codes, regulations or ministerial decrees concerning the banning of building constructions on certain should-be-conserved areas, or the control of building height, colour, form, covered area ratio (CAR), or floor area ratio (FAR) are very slow and hard to be promulgated or implemented.

In case of coastal tourist towns and cities which have grown and developed very rapidly during the past

Gloria's BEACH COTTAGES

Tourist cottages blended with nature

decade, codes and legislation aiming to regulate the buildings along the shore line could not be issued before; or even in time, to effectively preserve the natural beauty of the coast. The hotel owners or investors built their properties according to their will with the consideration of business profits alone. Consequently, a great number of gigantic, high-density, high-rise buildings have spread along the beach-front, destroying the greenery and natural beauty of the coast's skyline, especially on the popular beach resorts.

(4) Quality of-life values

Quality-of-life, particularly of the local community, is another aspect which is affected by tourism activities. The impacts are related to health, socio-cultural aspects, and public area occupation.

(a) Health

Inadequate or inefficient solid and liquid waste disposal systems may create health hazards, considering the fact that tourist and commercial establishments generally produce a big volume of waste during "peak" seasons.

The Indonesian case-study mentions that the condition of sanitation in Bali, is one of the worst compared to other international tourist resorts. The best sanitation system in Bali is the one developed by Bali Tourism Development Corporation (BTDC) for hotel in Nusa Dua which uses an integrated and recycled solid waste disposal treatment. While other hotels beyond BTDC jurisdiction use traditional septic tanks which admit wastewater and excreta only from toilets. Wastewater from other sources are thrown directly into the surface drains leading to rivers. It is not surprising therefore that the river water around Denpasar, Kuta beach, Nusa Dua, and Sanur has been polluted badly leading to periodic cases of stomach ailments (20 per cent of tourist in Bali suffer from such ailments).

(b) Unplanned urbanization

Only a few decades ago, most of the present beach resorts in ESCAP region were just small, quiet fishing villages or coconut, orchards. The fast growing tourism has transformed those agrarian communities into unplanned crowded cities. As a result, various shortcomings occur which include:

- Inadequate water supply.
- Insufficient road networks leading to traffic congestion and unsystematic road expansion.
- Shortage of telecommunication networks.
- Inadequate electricity supply.
- Unplanned physical development leading to visually unpleasant coastal structures and conflicting landuses.

(c) Socio-cultural

Coastal tourism development can lead to both the negative and positive impacts on socio-cultural values. On the positive side, traditional architecture is preserved, studied and used more frequently, although some elements are changed and modified to suit the tourists' preference. Old and lost traditions and crafts also get revived. However, the fast growing tourist market results in commercialization of artistic designs or production methods to cater for the 'foreigners' demands. Although, the loss and gains cannot be accurately quantified to state which is higher than the other, but at least some traditional values loss include:

Consumption changes and loss of values: The international beach resorts which receive large number of foreign tourists have the most prominent changes from subsistence consumption pattern to consumerism. Prostitution, vice and drugs, theft and petty crimes have also been reported to have increased. Icecream

Building along the watermark changes coastal dynamics and causes erosion

Construction of tourist establishments may result in loss of biodiversity

parlours, pizza and hamburger shops are getting more popular among local teenagers. Cost of living is getting higher which eventually leads to money-economy growth and materialism.

Commercialization: Communities along the shore are agricultural societies. Their traditional attitude or hospitality towards each other or visitors are money-free. With the increase of tourism the communities and societies have been gradually commercialized or commoditised. Give and take and other sacrifices have given way to benefits and greed. The more developed the resorts are, the higher is the commercialization of the society because:

- Introduction of "big city" tourist facilities has adversely affect local culture and lifestyle.
- Operation of ancillary commercial establishments (bars, discos, casinos, etc) often runs counter to local values and create social disharmony.
- The presence of foreigners and the promise of more income in some cases has encouraged local adult and child prostitution.

(d) Public area occupation

Tourism boom in several cases is also leading to public area encroachment through.

- Unscrupulous title deed acquisition. The private investors have often encroached into public land including national marine parks, mangrove forests, and marshlands. They have been able to acquire even the title deeds, over the occupied land and develop these for tourism business.
- Business premises extension. The private entrepreneurs, resort owners: shops, restaurants, have often encroached to extend or do business beyond their own premises. Usually they occupy the vacant public land nearby, or footpath in front of their shops. This phenomenon is common in most coastal tourist cities.
- Beach front occupation. Beach front is the most vulnerable public area for occupation by stalls and small vendors. Most of the famous beaches have make-shift stalls selling souvenirs, food and drinks. If it is not properly managed or controlled, by local administration, the vendors often settle permanently, giving the area a blighted look.

A checklist of the possible environmental impacts of coastal tourism by activity and affected zones, duration (short or long term) and possible actors causing them has been provided in table 2.2.

Table 2.2 Check list of possible coastal tourism development impacts on environment

Impacts on	Activities	Done by				Consequences			Activity zone			Affected zone		
		Govern-ment	Private investor	Tourist	All	Short-term	Long-term	Both	Terres-trial	Beach front	Marine	Terres-trial	Beach front	Marine
1. Physical environment														
A. Soil erosion	– Site clearance/grading for tourist facilities construction	x	x			x			x	x		x	x	x
B. Landslide	– Dredging/site grading for tourist facilities construction	x	x			x			x	x		x	x	x
C. Water quality degradation	– Dredging/site clearance causing turbidity and increase sedimentation	x	x			x			x	x		x	x	x
	– Waste from tourists and their activities pollutes water and soil			x				x	x	x		x	x	x
	– Oil spills and oily wastes from water sports, cruising and sight-seeing		x	x			x			x	x		x	x
	– Land-based sewage effluent		x				x		x			x	x	x
D. Coastline changes	– Sea walls and grayness construction	x	x				x			x	x		x	x
	– Extensive sea mining for construction	x	x				x		x	x		x	x	x
E. Wastes and ozone layer pollution	– More quantity of wastes and garbages those the existing disposal system to cope with				x		x		x	x	x	x	x	x
	– Irresponsible lettering		x	x			x		x	x	x	x	x	x
	– Lack of disposal system investment and measures	x	x				x		x	x	x	x	x	x
2. Ecological environment														
A. Coral reef damages	– Maritime wastes and discharge from tourist activities, cruising boats, etc.		x	x			x		x	x	x			x
	– Increased sedimentation and run-offs due to tourism development projects	x	x			x			x	x				x
	– Stepping corals or flipper-induced damages by divers			x			x				x			x

Table 2.2 *(Continued)*

Impacts on	Activities	Done by				Consequences			Activity zone			Affected zone		
		Govern-ment	Private investor	Tourist	All	Short-term	Long-term	Both	Terres-trial	Beach front	Marine	Terres-trial	Beach front	Marine
	– Anchor damages by diving and tourist boasts		x				x			x	x		x	x
	– Coral exploitation for souvenir and ornament trades		x	x			x				x			x
	– Irresponsible wastes littering		x	x			x			x	x		x	x
	– Alteration of water flow due to construction of tourist facilities	x	x					x	x	x			x	x
B. Loss of mangrove forest	– Diversion of freshwater flow due to tourist facilities development	x	x					x	x	x		x	x	
	– Conversion of mangrove area for tourist or commercial sites	x	x					x	x	x		x	x	
C. Depletion of marine lives	– Over exploitation of turtle as decorative or as ornamentals in souvenir trade		x	x			x			x	x			x
D. Depletion of underground water	– Over-fishing by tourists			x	x		x			x	x			x
	– Over utilization of underground their freshwater aquifer may severely effect islands' ecology		x	x				x	x	x		x	x	
3. Human use values														
A. Water supply	– Over extraction of ground water and river water may upset the water balance	x	x				x		x	x		x		
	– Large-scale tourism projects may cause a decrease in available water for local residents	x	x				x		x			x		
	– Leaching from land-fills or dumps may contaminate water supply	x	x					x	x			x		
	– Over-growth of coastal destination may lead to water supply shortage	x	x				x		x	x		x	x	

Table 2.2 *(Continued)*

Impacts on	Activities	Done by				Consequences			Activity zone			Affected zone		
		Govern-ment	Private investor	Tourist	All	Short-term	Long-term	Both	Terres-trial	Beach front	Marine	Terres-trial	Beach front	Marine
B. Power supply	– Over-growth of coastal destination may cause power supply shortage	x	x				x		x	x		x	x	
	– Large scale tourism projects may cause inadequate power supply to local community	x	x				x		x			x		
C. Public beach access	– Tourism development projects may obstruct the local public beach access		x					x	x	x		x	x	
D. Land use	– Tourism development may displace small fishing community or local residents	x	x				x		x	x		x	x	
	– Uncontrolled development may lead to conflicting land-use activities and unbalanced city land use	x	x					x	x	x		x	x	
E. Landscape	– Uncontrolled tourism development may lead to visual pollution, unaesthetic values and non-compatible architecture	x	x				x		x	x		x	x	
	– Over-crowded destination may lead to negative landscape values	x	x				x		x	x		x	x	
F. Loss of shoreline's beauty	– Coastal high-rise condominium and towers pollute the beach scenery	x	x				x		x		x	x	x	x
	– Over building without proper set-back destroy the coast's greenery	x	x				x		x	x		x	x	
4. Quality-of-life values														
A. Health	– Leaching from land-fills or dumps may induce public health risk	x	x					x	x	x		x	x	

Table 2.2 *(Continued)*

Impacts on	Activities	Done by				Consequences			Activity zone			Affected zone		
		Govern-ment	Private investor	Tourist	All	Short-term	Long-term	Both	Terres-trial	Beach front	Marine	Terres-trial	Beach front	Marine
	– Increasing demands due to tourism development may cause insufficient local health care facilities and personnel				x			x	x			x		
	– Presence of prostitution may cause higher incidence of sexually-transmitted diseases				x			x	x			x		
B. Unplanned urbanization	– Development of tourism-related projects concerned with short-term objectives has led to unplanned urbanization and crowding	x	x				x		x			x		
C. Socio-cultural	– Introduction of "big city" tourist facilities may adversely affect local culture and lifestyle	x	x				x		x			x		
	– Local norms and hospitality are commercialized because of tourism				x		x		x	x		x	x	
D. Public area occupation	– Investors' encroachment into public area, e.g. forest, national park, mangrove forest		x					x	x	x		x	x	
	– Business premises' extension to use adjacent vacant public area, e.g. footpath		x					x	x	x		x	x	
	– Beach front occupation by stalls, small vendors		x					x	x	x		x	x	

III. MEASURES FOR PROTECTION AND ENHANCEMENT OF ENVIRONMENT

The future of sustainable coastal tourism development is linked to the control of adverse environmental impacts on the environment. This chapter describes various preventive and remedial measures and guidelines for sustainable development of coastal tourism under the following heads:

(a) Planning measures
(b) Legislative measures
(c) Institutional measures
(d) Other support measures

A. Planning measures

Planning is a widely accepted means for effective management. A good plan, which can be undertaken at various scale or levels e.g. national level, provincial level, or project level, will help all parties concerned to have a common vision and enable them to put their efforts and contribution into the same desirable direction.

Many countries in the ESCAP region have already prepared tourism development plans and studies at national, regional or local levels. Thailand for example has already prepared at least 12 plans and studies related to its coast. (table 3.1). Other countries are also making headway in this direction. An Indonesian plan "Sustainable Development Strategy for Bali", highlighting planning issues eloquently states:

Table 3.1 Tourism plans and studies conducted in 6 selected countries

Country		Plans/studies
Fiji	1.	9th National Development Plan (1986-1990).
	2.	"Government of Fiji: Tourism Masterplan", 1991.
	3.	The Coral Coast Tourism Development Study, 1991.
Malaysia	1.	National Tourism Development in Malaysia (1978-1995).
Maldives		n.a.
Philippines	1.	Tourism Master Plan.
	2.	Medium-Term Philippine Development Plan (1987-1992).
	3.	The Philippine Strategy for Sustainable Development (1989).
Indonesia	1.	Comprehensive Tourism Development Plan for Bali (1990).
	2.	Sustainable Development Strategy for Bali (1992).
	3.	Prospects on the Development of Tourism Sector in Indonesia, 1989; Ready to take off (1989).
Thailand	1.	National Plan on Tourism Development (1976).
	2.	Pattaya Tourism Development Master Plan (1977).
	3.	Master Plan and Feasibility Study of Tourism Development of Phuket (1979).
	4.	Master Plan of Tourism Development of Songkhla/Hatyai (1980).
	5.	Master Plan of Tourism Development of Rayong/Chantaburi/Trad (1985).
	6.	Master Plan of Tourism Development of Kho Samui/Surat Thani (1985).
	7.	Master Plan of Tourism Development of Phetchaburi/Prachuab Khiri Khan (Hua Hin/Cha-Am) (1987).
	8.	Preliminarily Study for Tourism Development of Chumphon/Ranong (1987).
	9.	Preliminary Study for Tourism Development of Nakhon Sri Thammarat/ Pattalung/Trang (1984).
	10.	The Study on Potential Tourism Development for the Southern Region of Thailand (Phuket/Phan Nga/Krabi) (1989).
	11.	A Study on Carrying Capacity for Tourism Development of Koh Samui (1988).
	12.	The Action Plan for Tourism Development of Koh Samui Under Its Carrying Capacity (1990).

'Little cross-sectoral or integrated planning policy exists. Each sectoral agency has its own function, and quite often disregards its cross-sectoral impacts and the relationships of various coastal ecosystems. This has caused overlapping of mandates and conflict of interests among agencies'.

The most important element in planning is therefore to avoid intersectoral and cross sectoral conflicts. Moreover, it is also imperative to muster support from all interested groups in its formulation and implementation and see that environmental considerations are duly incorporated into the tourism development plan. The process for the preparation of a plan including these basic concepts has been depicted in figure 3.1. It was derived from the case-study of the Philippines. The plan covers the island of Boracay, located at the northwestern tip of Panay island in Western Visayas (figure 3.2). The island has been declared as a tourist zone under a Presidential Proclamation (Proclamation No. 1801). And the master plan formulated for its development forms the basis for public and private sector developments. The planning and implementation process of this plan involves cross sectoral interaction through inter-agency coordination and consulations with interested group. Further, preparation of a full scale environmental impact statement has set the framework for the integration of environmental concerns in the guidelines for site planning, physical development and management.

(1) Guidelines/concepts on physical planning in resorts

In preparing a sustainable physical development plan for tourism an important first step would be the formulation of environmental guidelines by incorporating parameters of significance. For example, the framework guidelines of particular importance[4] to the physical development of a small or medium scale resort in a small island should:

- Exclude development from the geologically unstable zones (such as high erosion areas);
- Define zones for development;
- Provide adequate buffer zones between development and Existing shorelines;
- Minimize wind effects by keeping the height, shape and location of buildings within the canopy of the natural vegetation, which should be preserved;
- Design all facilities and services with minimum environmental destruction;
- Where possible, ensure that construction materials and methods are compatible with the reef-cay environment;
- Control strictlty the disposal of all rubbish and surplus or worn-out items; and
- Control effluent disposal to prevent disturbances to the reef-flat ecology.

Tourist hotels built in harmony with nature

There are many planning strategies and concepts which are useful in coastal tourism development. One can start for example with a general strategy based on simple environmental zoning by identifying two types of zones (i) intensive development and (ii) conservation area with controlled development and then proceed further. Japan International Cooperation Agency (JICA) recommended such a strategy with two zoning components for coastal tourism development in Thailand's Upper South Region. The first one recommended that inside the resort towns the development should be prohibited in beach areas. The second component allowed to cope with actual development and future demand, by permitting development on a limited number of beach areas to maintain a balance of tourism activities between these and the resort town.

(2) Carrying capacity and tourism planning

An effective formulation and implementation of realistic strategy to avoid tourism pressure on environment in a locality are often based on the estimation of carrying capacity. The carrying capacity concept has been in use in recreational planning in coastal areas since the early 1960s. It is applied in terms of "Number of user-unit periods that a recreational site can provide (each year) without permanent biological and physical deterioration of the site's ability to support recreation and without appreciably impairing the quality of the recreation experience". This definition related mainly to physical and biological characteristics of the tourism site could be simplified to state, "Optimum carrying capacity is the maximum number of tourists that can

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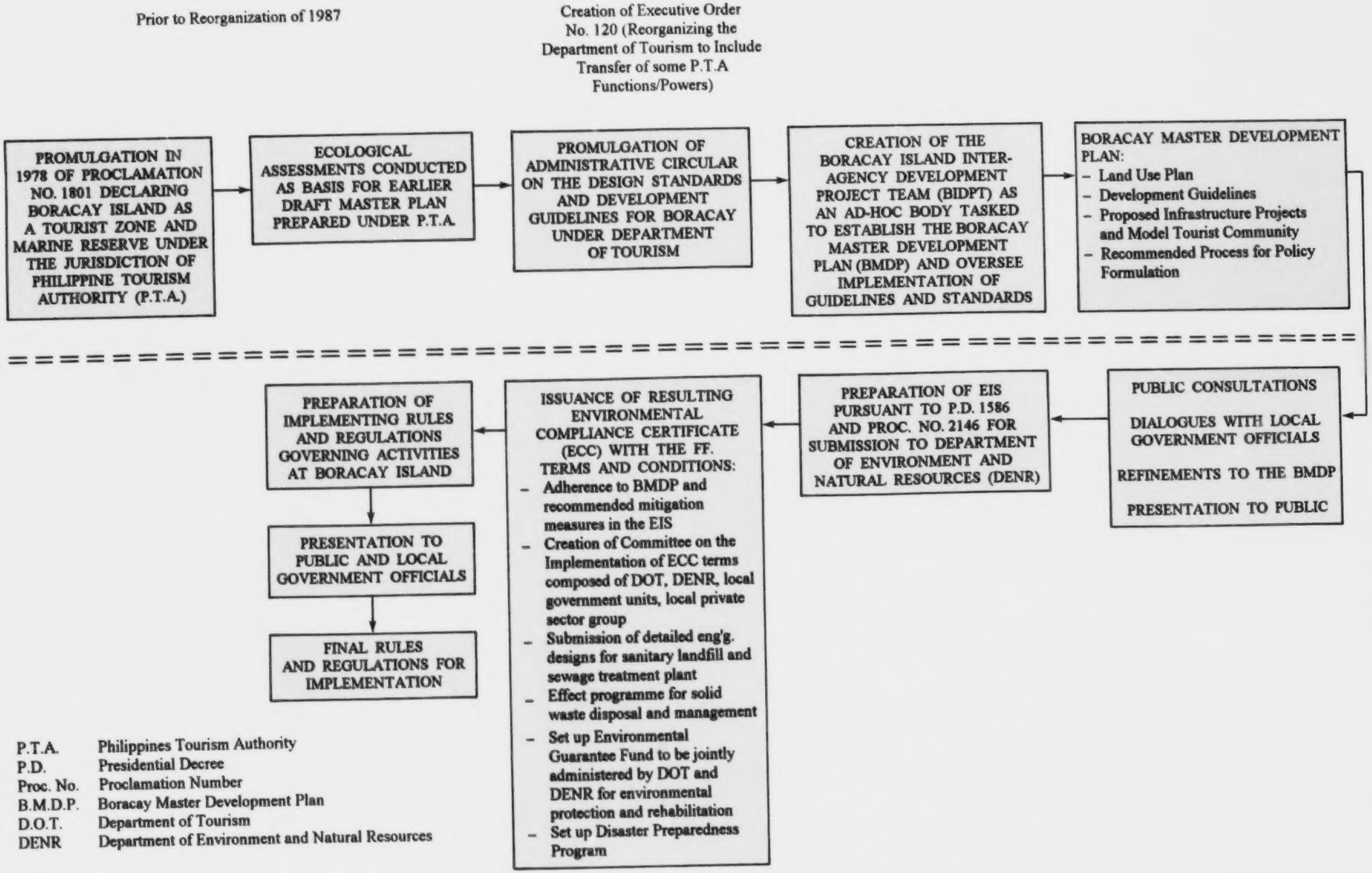
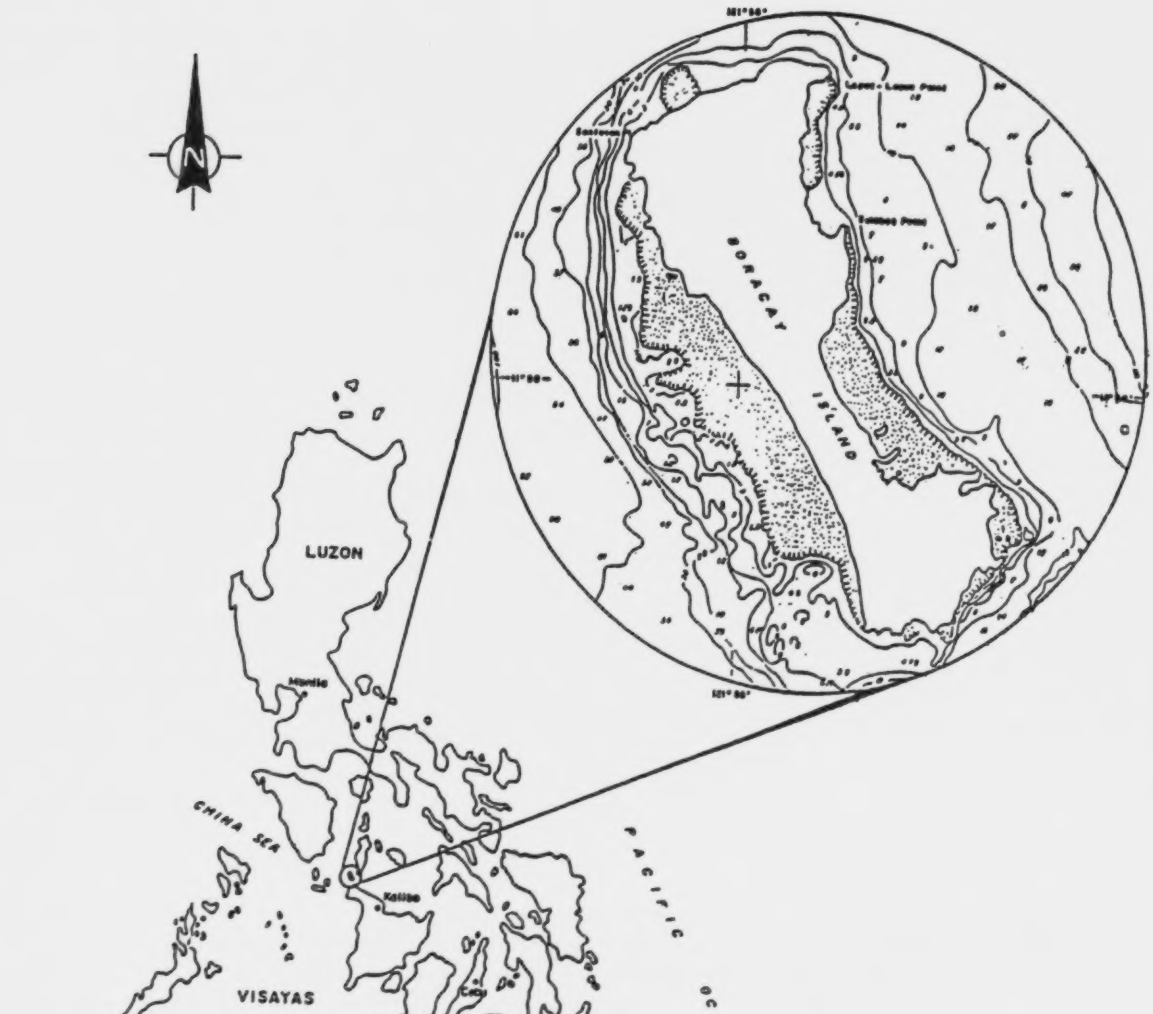
[4] Wong P.P. (1991), *"Coastal Tourism in South East Asia"* ICLARM, Manila.

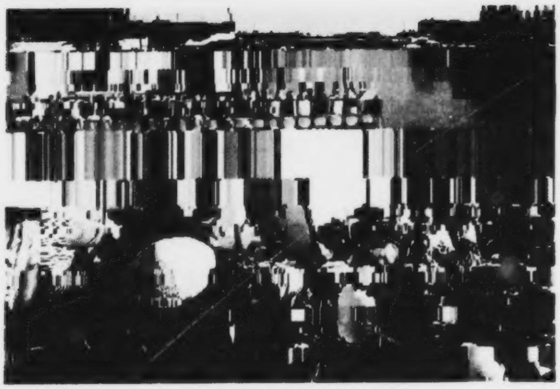
Figure 3.1 Process for incorporation of environmental considerations into the Boracay Master Development Plan


Prior to Reorganization of 1987
Creation of Executive Order No. 120 (Reorganizing the Department of Tourism to Include Transfer of some P.T.A Functions/Powers)
PROMULGATION IN 1978 OF PROCLAMATION NO. 1801 DECLARING BORACAY ISLAND AS A TOURIST ZONE AND MARINE RESERVE UNDER THE JURISDICTION OF PHILIPPINE TOURISM AUTHORITY (P.T.A.)
ECOLOGICAL ASSESSMENTS CONDUCTED AS BASIS FOR EARLIER DRAFT MASTER PLAN PREPARED UNDER P.T.A.
PROMULGATION OF ADMINISTRATIVE CIRCULAR ON THE DESIGN STANDARDS AND DEVELOPMENT GUIDELINES FOR BORACAY UNDER DEPARTMENT OF TOURISM
CREATION OF THE BORACAY ISLAND INTER-AGENCY DEVELOPMENT PROJECT TEAM (BIDPT) AS AN AD-HOC BODY TASKED TO ESTABLISH THE BORACAY MASTER DEVELOPMENT PLAN (BMDP) AND OVERSEE IMPLEMENTATION OF GUIDELINES AND STANDARDS
BORACAY MASTER DEVELOPMENT PLAN:
- Land Use Plan
- Development Guidelines
- Proposed Infrastructure Projects and Model Tourist Community
- Recommended Process for Policy Formulation
PUBLIC CONSULTATIONS
DIALOGUES WITH LOCAL GOVERNMENT OFFICIALS
REFINEMENTS TO THE BMDP
PRESENTATION TO PUBLIC
PREPARATION OF EIS PURSUANT TO P.D. 1586 AND PROC. NO. 2146 FOR SUBMISSION TO DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES (DENR)
ISSUANCE OF RESULTING ENVIRONMENTAL COMPLIANCE CERTIFICATE (ECC) WITH THE FF. TERMS AND CONDITIONS:
- Adherence to BMDP and recommended mitigation measures in the EIS
- Creation of Committee on the Implementation of ECC terms composed of DOT, DENR, local government units, local private sector group
- Submission of detailed eng'g. designs for sanitary landfill and sewage treatment plant
- Effect programme for solid waste disposal and management
- Set up Environmental Guarantee Fund to be jointly administered by DOT and DENR for environmental protection and rehabilitation
- Set up Disaster Preparedness Program
PREPARATION OF IMPLEMENTING RULES AND REGULATIONS GOVERNING ACTIVITIES AT BORACAY ISLAND
PRESENTATION TO PUBLIC AND LOCAL GOVERNMENT OFFICIALS
FINAL RULES AND REGULATIONS FOR IMPLEMENTATION

P.T.A.	Philippines Tourism Authority
P.D.	Presidential Decree
Proc. No.	Proclamation Number
B.M.D.P.	Boracay Master Development Plan
D.O.T.	Department of Tourism
DENR	Department of Environment and Natural Resources

Figure 3.2 Location of Boracay Island in the Philippines


N
BORACAY
ISLAND
LUZON
Manila
CHINA SEA
PACIFIC OCEAN
Kalibo
VISAYAS
Cebu
SULU SEA
MINDANAO
CELEBES SEA
Philippines



Overcrowding of tourist resorts poses a threat to the environment

be catered for while making full use of the recreational facilities and without damaging the environment" . However, fuller definitions of carrying capacity is the level of visitors use an area can accommodate with high levels of satisfaction for visitors and few impacts on resources. The concept implies that there are limits to visitor use.

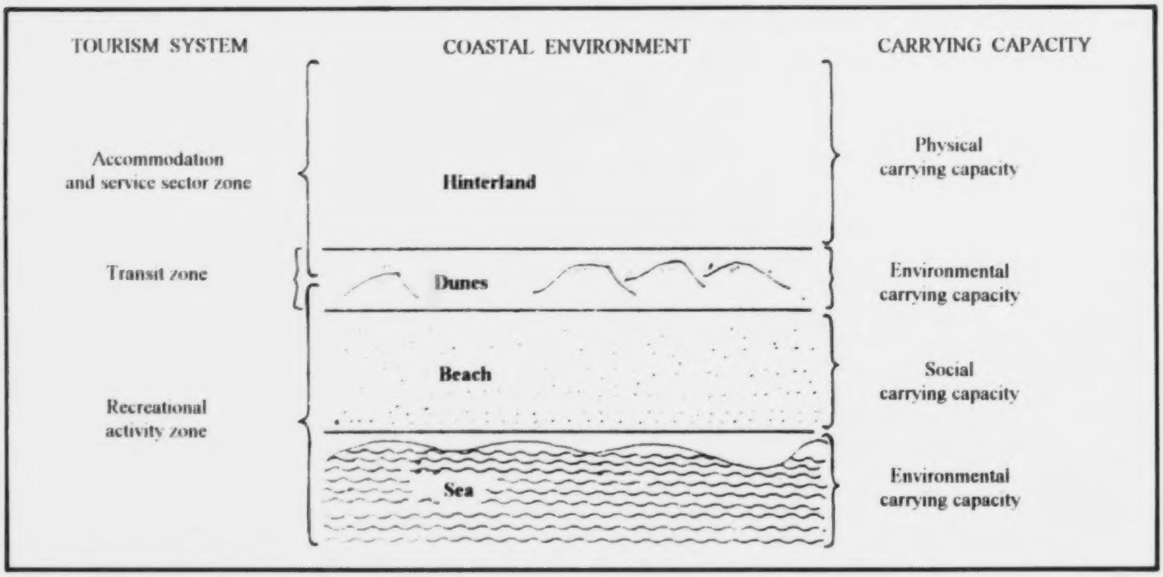
A detailed methodology for estimating carrying capacity with an Indonesian example is given in annex I. Carrying capacity estimates are determined by many factors and in the end, they depend on administrative decisions about approximate sustainable levels of use. The major factors in estimating carrying capacity are (a) environmental, (b) social, and (c) managerial. The formula to estimate the tourist carrying capacity of a given area, consists of dividing the area to be used by tourists by the average individual "standard" (usually in m^2/person) required. The individual standard, however, may vary in different situations and need careful definition in each particular case. It would require consideration of differing types of carrying capacity — environmental, physical and social (perceptual) — for each type applies and has been applied to different and often quite specific parts of the tourism system and the coastal environment. Their relationships in a typical coastal resort have been depicted schematically in figure 3.3.

The concept of carrying capacity related to tourism has been applied in several studies in the countries of ESCAP region. For example the carrying capacity concept has been used in terms of rooms per km of beach in a study of southern Thailand which were determined at 200, 100 and 0 rooms for intensive development, limited development and preservation, respectively. Several proposals were also given to increase the beachs' carrying capacity; reservation of some part of the beach for international tourists, reservation of other parts for the general public and provision of transportation links between different tourist areas. Another study was conducted for Ko Samui Island in Thailand. (see box 3.1 and annex II).

(3) Planning standards and development controls

Planning standards constitute the basic ingredients of a carrying capacity study. This is why the deve-

Figure 3.3 Schematic representation of the spatial relationships between elements of the tourism system, the coastal environment and carrying capacity


TOURISM SYSTEM
COASTAL ENVIRONMENT
CARRYING CAPACITY
Accommodation and service sector zone
Hinterland
Physical carrying capacity
Transit zone
Dunes
Environmental carrying capacity
Beach
Social carrying capacity
Recreational activity zone
Sea
Environmental carrying capacity

Source: D.G. Pearse, and others (1986), "Carrying capacities for coastal tourism", *UNEP Industry and Environment*, vol. 9, No. 1 (January-March 1986). (21).

Box 3.1 A Study on Carrying Capacities for Tourism Development in Koh Samui

It is widely accepted that too many tourists in one place can damage the environment. And the concept of carrying capacity study is believed to be a key indicator providing the appropriate number of tourists the place can support sustainably. Tourism Authority of Thailand (TAT) entrusted Thailand Institute of Science and Technology Research (TISTR) to conduct the study on the tourist carrying capacity of Koh Samui in 1988 in order to identify the physical, environmental and social carrying capacities of the island. The study was also to recommend measures for controlling the number of tourists within the limit not harmful to the attraction places and provide guidelines for planning preventive measures against the foreseeable problems.

Following resource-oriented approaches, the study covered three aspects of carrying capacity:

(1) Environmental carrying capacity: referring to the number of tourists or vacation activities which jeopardize the value of the environment.

(2) Physical carrying capacity: referring to the saturation of tourism facilities or physical destruction of the environment including the man-made ones.

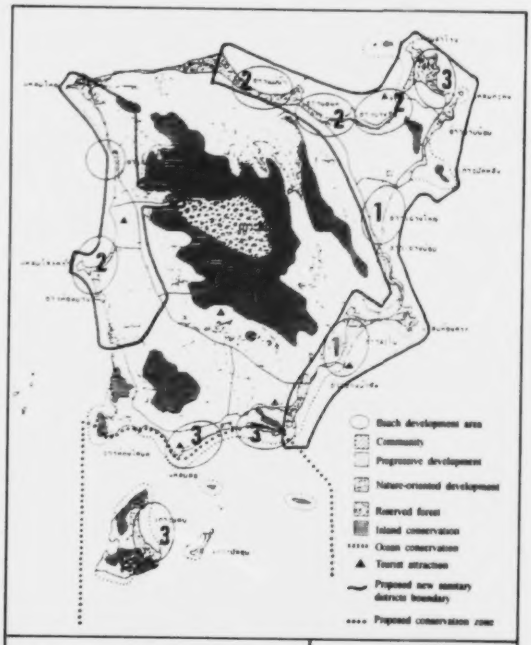


Figure 4 Zoning of the Tourism area and proposed new sanitary districts

A STUDY ON CARRYING CAPACITY FOR TOURISM DEVELOPMENT OF KO SAMUI

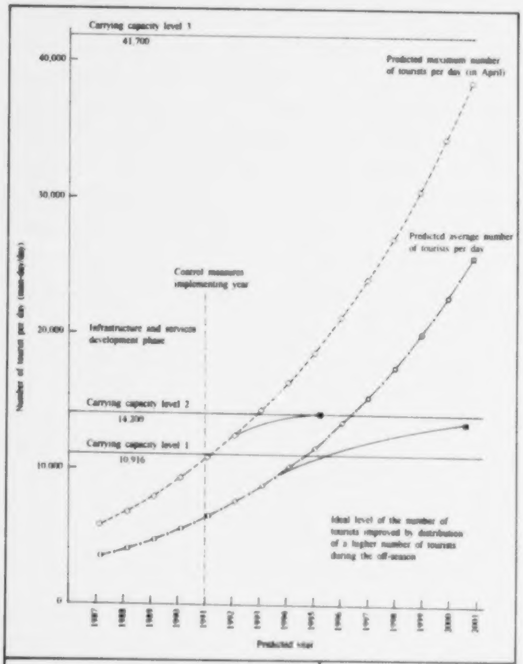


Figure 3 An appropriate ideal number of tourists for tourism development of Ko Samui

A STUDY ON CARRYING CAPACITY FOR TOURISM DEVELOPMENT OF KO SAMUI

(3) Social (Perceptual) carrying capacity: referring to the diminishing satisfaction of tourists as well as the negative perception of the local residents.

(4) The three aspects, involving varied factors gave different carrying capacities. After comparative study and synthesis, the study pointed out that the tourism carrying capacity at maximum density of 14,200 man-day/day, will maintain the identity and typical tourism pattern of Koh Samui, under appropriate and effective management of the development process. Expansion of the number of tourists must therefore be controlled within the maximum limit. The study provided guidelines on the appropriate and effective management, the proposed recommendations for which covered the following aspects:

1. Zoning of the tourism areas.
2. Land-use control
3. The government infra-structure and utilities improvement.
4. Tourism services control.
5. Upgradation of local administration.
6. Appropriate budget allocation.

lopment of planning standard in tourism has been emphasized by the World Tourism Organization (WTO). Planning standards may vary depending on factors such as location and quality of coastal resort, development policies of the government and existing legal framework. Their main purpose is to provide statistical measures of assessing visitor numbers relative to the threshold levels or carrying capacity, land and building areas, infrastructural requirements, and the needs of support population and services. These parameters are the backbone of resort planning, and in formulating development proposals and physical plans for resorts.

Table 3.2 Selected common planning standards for beach resorts

1. Accommodations	
a. Hotels	
Economy	10 m^2/bed
Average	19 m^2/bed
Luxury	30 m^2/bed
b. Seaside holiday villages	15 m^2/bed
c. Apartments in beach resorts	
Studio	36 m^2
1-bedroom unit	53 m^2
2-bedroom unit	110 m^2
2. Infrastructure	
a. Water (daily consumption per person)	
Mediterranean resorts	200-300l/day
Tropical beach resorts	500-1,000l/day
b. Sewage disposal (no main system)	0.3 ha/1,000 persons
c. Access road and parking	
Parking lots	1/2-4 bedrooms
Overall density	5-15 per cent of site
3. Tourist facilities	
a. Swimming pool (resort hotel)	3 m^2 of water/user
b. Open space (seaside resort)	20-40 m^2/bed
c. Shops	0.67 m^2/bed

Source: WTO, 1981. Proceedings of the Workshop on Resort Planning.

The standards are established through building codes and other regulations. Building codes enable the implementation of the concept and image of the resort area, particularly its perceived characteristics with respect to site and the environment. It provides for control on types of building, their location, height and density, and site characteristics. An effective tool to control density in the code is site and plot ratio. For example, in low-density development, resorts have a plot ratio of 1:0.15 or even less.

There are two categories of planning standards for resorts. The common standards which are summarized in table 3.2 and are applied to all resorts in developing accommodation, infrastructure and tourist facilities. The special standards are applicable only to specific resorts (table 3.3). These are based primarily on European and American experiences and need to modified to suit the region's need and environment.

Concerning crowding or density of people, a number of carrying capacity guidelines exist to ensure a reasonable quality of experience:

- Beach: 10-15 square metres per person;
- Angling from a boat: 2 boats per hectare;
- Small boats: 2-6 per hectare;

Table 3.3 Selected special planning standards for beach resorts

1. Beach capacity (for resort excluding facilities)		
	m^2/person	person/m of coast
a. Low standard	10	2.0-5.0
b. Medium standard	15	1.5-3.5
c. Comfort	20	0.7-1.5
2. Beach facilities	Sanitary facilities in ratios of 5 water closets, 2 lavatory basins and 4 showers for every 500 persons	
3. Resort density		
a. In Spain, Greece, Bali, Honolulu	60-100 beds/ha	
b. Club Mèditerranèe Village	20 beds/ha	
4. Marina facilities		
a. Size	150-200 boats minimum to about 500 boats maximum	
b. Harbour capacity	75-100 boats/ha	
c. Land area	100 boats/ha for parking, boat storage, maintenance and administration	

Source: WTO, 1981. Proceedings of the Workshop on Resort Planning.

- Sailing boats: 1-2 per hectare;
- Water-skiing: 1 boat for every 2-4 hectares;
- Low density picnicking: 40-100 people per hectare;
- Forest nature trails: 10 persons per kilometre (well used).

These standards can be used to assess either the number of people that can satisfactorily be catered for at a specific site or the size that a particular area must have in order to cater for an estimated number of visitors. Major deviations from the guidelines would heighten or lessen the recreational carrying capacity of the area. Recreational facilities provided by luxury resorts would aim to increase the above spaces, whereas cheaper resorts would perhaps plan to decrease them.

Some of the recreational activities are incompatible with each other. Thus sailing boats and speed boats should not be operating in the same area at the same time, particularly if it is enclosed (e.g. a lagoon). Such incompatible activities must either take place in different areas or at different times in the same area. If different areas are used, then the amount of sea or lake required to satisfy all recreation demands will be larger.

Visitors access to an area can be reduced in a number of ways by:

- Reducing car parking facilities;
- Prohibiting access by car;
- Imposing or increasing admission charges;
- Closing the entertainment facilities at certain times;
- Developing alternative sites for visitors;
- Concentrating activities in non-vulnerable areas, thereby reducing pressure on vulnerable areas (the "honeypot" concept);
- By banning entirely some types of activities in the area.

The carrying capacity of an area can be increased by a number of measures including:

- Careful design and maintenance of paths, trails, etc to reduce or avoid damage by walking or flooding;
- Re-routing paths, trails away from sensitive areas such as rare or fragile vegetation of breeding areas of aquatic life, etc;
- Marking of routes in inter-tidal coral areas away from the most sensitive zones;
- Visitor education on the needs for environmental consideration;
- Improving the standards of management and supervision.

B. Legislative measures

Tourism is one of various sectors in the overall economy of a country, the environmental impacts of which have to be dealt with or controlled by environment related legislation. Most countries in the ESCAP region have already promulgated environmental-protection laws, which are used as a broad framework or umbrella legislation for environmental management. Indonesia has an Environmental framework legislation besides other legal provisions some of which date back to 1916.[5] Malaysia promulgated an Environmental Quality Act in 1974, Thailand and Philippines also have umbrella acts, Maldives has also developed one recently. However, there is no specific overall legislation for environmental management in Fiji, although environmental considerations are included in various statutes and decrees (table 3.4).

Besides umbrella legislation, other areas of importance in coastal tourism are protected area legislation, land-use zoning and EIA legislation. The status of various legislations related to tourism development in case study countries is given in table 3.5.

(a) Protected areas legislation regulation

Spatially speaking, different areas along the coast have different environmental fragility. Mangroves which act as marine animal hatchery are, for example, more sensitive and vulnerable to ecological disturbance than bare rocky mountain, though both are situated along the coast. More attention and protective schemes therefore need to be given to those fragile but valuable areas, by issuing laws or more easily introduced regulations. Essentially protected areas legislation/regulation should have the following provisions:

(i) A brief statement outlining national conservation and protected areas policy (e.g. from National Development Plans or the Constitution). It should state the conservation and other goals to be achieved by the legislation;

(ii) A specific section on objectives of the protected areas for designation. Such objectives may include:

  - To safeguard and maintain representative samples of the nations' natural eco-

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[5] Susan M. Woods, Harry Harsono Amir, and Michael Bordt, "Environmental Management in Indonesia: Challenge and Response 1991.

Table 3.4 Environmental laws in Fiji related to coastal tourist development

Legislation	Outline of provision	Penalty	Authority responsible
Land and Resource Use			
Mining Act 1966 (Cap 146)	– Compensation for damage – Restoration of land	Max fine $200 and/or 6 months imprisonment.	Director of Mines and Ministry of Land and Mineral Resources.
Forest Act 1953 (Cap 150)	Minister may declare nature reserves and sylviculture areas in reserved forests and declare native land to be a protected forest.	Max fine $300 and/or 6 months imprisonment.	Conservator of Forests and Ministry of Forestry.
Town Planning Act 1946 (Cap 139)	Minister may order area to be a town planning area: permission of local authority and Director of DTCP required for development. Preservation of historic buildings and objects of historic of scientific interest.	Max fine $100 or 3 months imprisonment $20 per day for infringement.	Director of Town and Country Planning and Ministry of Housing and Urban Development.
Native Land Trust Act 1940 (Cap 134)	Can lease Native Land (which is not Native Reserve land) with restrictions regarding land use.	Civil Remedies	Native Land Trust Board
Land Development Act 1961 (Cap 134)	Land Development Authority promotes and assists the investigation, formation and carrying out of projects for the development, improvement and settlement of the land.		Land Development Authority
Land Development Act 1961 (Cap 142)	Land Conservation Board may make 'Conservation Order' Contravention of such order is an offence. Stipulates 'good husbandary practices' by tenants.	Max fine $200 and/or 6 months imprisonment.	Land conservation Board, Ministry of Primary Industries.
Conservation and Quarantine			
Birds and Game Protection Act 1923 (Cap 170)	Wounding, killing, selling, holding in captivity or exporting protected birds is an offence.	Max fine $50 or imprisonment max 3 months.	Ministry of Primary Industries.
National Trust for Fiji Act 1970 (Cap 265)	– Power to purchase land – May enter into voluntary agreements to protect the land.		Ministry of Housing and Urban Development
Reservation of objects of Archaeological and Palaeontological interest Act 1978 (Cap 264)	– Power to declare and acquire National Monument's – Preservation of Monuments.	Max fine $200 or 6 months imprisonment.	Board of Trustees of Fiji Museum and Ministry of Women and Culture.
Quarantine Act 1982; Noxious Weeds, Pests and Disease of Plants Act 1964, (Cap 133)	– Quarantine powers including declaration of noxious pests, infested places; removal of pests; prohibited imports.		Ministry of Primary Industries.
Animal Importations Act (1970)			Ministry of Primary Industries.
Marine and Pollution/ Conservation			
Marine Spaces Act 1977	– Management and conservation of fisheries within Fiji's economic zone (200 mile limit).		Office of the Prime Minister.
	– Licensing of foreign fishing vessels.	Maximum fine $100,000	
Fisheries Act 1941 (Cap 158)	– Licence to fish required.	Maximum fine $50 and/or 3 months imprisonment.	Ministry of Primary Industries.
	– Non Fiji registered fishing vessel fishing without Licence.	Maximum fine $100.	
	Use of dynamite.		

Table 3.4 *(Continued)*

Legislation	Outline of provision	Penalty	Authority responsible
Fisheries Regulation 1965	– Prohibited methods and areas e.g. poison – Protection of turtles, etc.	Maximum fine 12 months and/or $200 fine.	
Continental Shelf Act 1970 (Cap 149)	Oil pollution of 'designated areas' resulting from escape from pipeline or as a result of exploration.	Maximum fine $3,000.	Ministry of Lands and Mineral Resources.
Ports Authority of Fiji Regulations 1990	Various offences relating to pollution of port areas.	Maximum fine $400.	Ports Authority of Fiji.
Center Pollution			
Rivers and Streams Act 1882 (Cap 136)	Rivers belong to the Crown and are for enjoyment of public.		
Irrigation Act 1973 (Cap 144A)	Offence to pollute water in Irrigation Works.	Max fine $200 or 6 months imprisonment.	Commissioner for Irrigation and Ministry of Primary Industries.
Drainage Act 1961	Offence to interfere with public drainage work i.e. work for the purpose of draining land or of preventing or mitigating flooding or erosion.	Max fine $200 or 6 months imprisonment.	Appropriate Drainage Board and Ministry of Primary Industries.
Water Supply Act 1955 (Cap 144)	Offence to pollute water if:- – In waterworks i.e. sluice, pipe, pump etc. used for water supply or in declared catchment area.	Maximum fine $100.	Commissioner of Water; PS – Ministry of Primary Industries.
Mining Regulations (Cap 146 S-3)	Offence to pollute water in race pipe dam or reserving in respect to which a special site right has been granted to holder of mining lease.	Max fine $100	Director of mines and Ministry of Lands and Mineral Resources.
Pollution Generally			
Pesticides Act 1971 (Cap 157)	Registration of pesticides.	Fine $200 and $10 per day for infringement.	Registrar of Pesticides and Ministry for Primary Industries.
Traffic Regulations 1974 (Cap 176 – S-50)	Offence to drive vehicle from which smoke etc. is emitted likely to cause injury, nuisance or annoyance to any person.	Max fine $100 or imprisonment max 3 months.	Ministry of Infrastructure and Public Utilities.
Public Health Act 1935 (Cap 111)	– Board may cause inquiries to be made. Person authorized in writing may enter premises. – Power to inspect water and sewerage works.		Central Board of Health (Ministry of Health).
	Various powers to abate nuisances:- – Inspection of district to ascertain nuisances.		Local authorities or Central Board of Health (Ministry of Health).
	Section 56 (e): any accumulation or deposit of any material situated which is offensive to the public or injurious to health may be summarily abated.	Fine $20 or $4 per day in default.	
Penal Code 1945 (Cap 17)	Various e.g. common nuisance i.e. causing common injury, danger or annoyance so as to interfere with public (must be substantial and unreasonable).	Imprisonment 1 year.	Director of Public Prosecutions (Ministry of Justice).
	Dealing with poisonous substance in negligent manner.	6 months imprisonment or $200 fine.	

Table 3.5 Legislation related to sustainable development of coastal tourism in the case-study countries (comparative study)

	Umbrella legislation	Water pollution	Air pollution	Land use planning	Coastal environment	Forest/ park	Environment impact assessment
Fiji	0	*	*	**	**	**	*
Indonesia	***	*	*	*	*	*	***
Malaysia	***	**	**	***	*	***	***
Maldives	***	*	0	***	*	*	**
Philippines	***	**	**	**	**	**	***
Thailand	***	*	*	**	*	**	**

Note:
*** Extensive coverage.
** Moderate coverage.
* Minimal coverage.
0 In the process of development.

systems, endangered species of scientific importance and sites of cultural or historical value;

- To provide educational and recreational services;

- To provide for multi-use resource areas for protection and social and economic benefit.

(iii) That land can be established on public, private and custom land and that donations of land can be accepted and that land can be purchased or leased. The legislation must recognize existing land laws and take them into account, and also any other rights e.g. timber and mineral rights that may exist.

(iv) Authorize establishment of protected areas with the approval of the highest legislative body in the country. Powers to amend and abolish should only be through superseding legislation by the same authority.

(v) Designate an individual or institution with responsibility to identify areas for protected status or change in status. The procedure for such nominations should be detailed, together with the role of other Government and public bodies and a time frame for the process.

(vi) Require surveys of the area for designation with clearly defined boundaries.

(vii) Require the establishment of types of protected area e.g. national parks, games and wildlife reserves, and other, recreational areas, fishery sanctuary, areas for protection of rare and endangered species and historical and cultural heritage, etc. The management categories should be defined and protection, enforcement and administrative procedures should be detailed.

(viii) Give powers for a potential protected area to obtain immediate interim protection. This is to safeguard it from managing development while the often lengthy process of declaration is in progress.

(ix) Require preparation of management plans fo each protected area. Procedures for the preparation, adoption and the detailed format of such plans should also be specified.

(x) Require the establishment of buffer zon outside the protected area, in which certai types of activities detrimental to it are prohibited.

(xi) Indentify or establish the agency to be responsible for protected areas establishmen and management. The duties and function of this agency should be clearly defined an it should be allowed general powers to authorize any further procedures that may b necessary to perform its duties.

(xii) Identify or establish some mechanism fo intergovernmental coordination, public pa ticipation and education and advisory assi tance on scientific and technical matter This can be done by including provision fo establishing an advisory committee wit relevant membership and a name such a

TOUR CO-OPERATOR
FORMATION
SIGHT SEEING TOUR
HOTEL BOOKING
BUNGALOWS BOOKING
AIRPLANE TICKET
FLIGHT RECONFIRMATION
TELEPHONE SERVICE
EXCHANGE SERVICE
VISA CARD, MASTER CARD
AND T/C ACCEPTED

National parks offer great potential for ecotourism

Protected Areas Committee, Conservation Council, National Parks Board, etc. The duties and functions of this committee need to be defined.

(xiii) Designate a special fund that could receive money from any source-revenue from protected areas, donations from individual, companies or international agencies.

(xiv) Give details of prohibited and regulated activities for each type of protected areas.

(xv) Designate officers required for enforcement with their duties and powers. (Authorized officers usually include those employed directly and full time by the protected areas agency, as well as those who may be authorized from time to time such as forestry officers, police, local government officials and so on).

(xvi) Include penalties and procedures to deal with violators/offender quickly by the appropriate court. If possible, a reversal of the burden of proof procedure should be authorized i.e. the offender must prove his innocence, rather than be proven guilty. The legislation should clearly define penalties for each category of offence. Upon conviction, the legislation should ensure forfeiture of any fauna, flora, objects or devices taken, used or involved in committing the offence.

(xvii) Procedure for public involvement in the creation, amendment or abolishment of protected areas, in their management and representation on advisory bodies.

(xviii) Separate enabling provision to empower the relevant authority to issue or revise as necessary regulations to enable the improved working of the act.

(b) Relevant town planning legislation, including land-use zoning

Whenever tourism is introduced into a coastal area, a small rural community may be transformed through a rather quick path into a village, small town and eventually city. The urbanization process, in many cases, is so rapid that the legislation or regulation may lag behind, leading to a messy and haphazard tourist town. Authorities should prepare physical or land-use zoning plans to expedite evelopment of potential tourism resorts.

The urgent measure needed to effectively control and regulate such growth is through land-use zoning expeditiously. The authorities should prepare physical or land-use zoning plan to promote sustainable growth in potential resorts and prevent the unpleasant conflicting coastal land utilization.

The Governments in ESCAP region need to issue laws and regulations to separately control land-use in every high potential coastal areas. The already developed tourist cities are the first needed priority for regulation and control and stringent enforcement in order to stop conflicting problems. High potential coastal areas attractive from tourism perspective also need land-use zoning regulation, in order to prevent the similar problems from emerging.

(c) Environmental Impact Assessment (EIA legislation)

EIA legislation in countries in the ESCAP region may have provision for EIA of resort development schemes/projects at the inception or construction stage.

However, it is notable that tourist entrepreneurs are seldom required by Governments to produce either social or environmental impact assessments of the results of importing large numbers of people into coastal resorts under tourist development schemes. Changes brought by this kind of tourism may be lamented or admired retrospectively, but few attempts are made to anticipate and manage them, so that the "carrying capacity" of fragile ecosystems can be defined on the basis of stay or mode or their behaviour. It may be mentioned that package tourists, who travel in busloads from airport to motel or enjoyment sites, have different environmental impacts than small parties of independent tourists.

(d) Enforcement of legislation

The provision of law is not enough; for effective management it needs to be enforced. Observations in case-studies show that the enforcement of legislation is not effective due to a number of reasons. These include lack of manpower and monitoring facilities, ineffective penalties etc. The existing laws in many countries in the ESCAP region have for example stipulated penalties or fines to the offenders but the level or amount of penalties is so light that the offence cannot be prevented.

In the case of foreshore leases in the Philippines, for instance, violators get off lightly with a curtailment of privileges and legal fines. For hotels, apartels, tourist inns, resorts and other tourism related-establishments, fines of 50 pesos per day or 1,000 pesos up to 20,000 pesos, or a jail term of six months up to five years, depending on the nature of the violation, are the sanctions provided under existing regulations. The same holds for pollution control, which makes offenders pay fines up to 5,000 pesos everyday that the violation or default continues or face closure of operations if the fines are not paid. The law also provides for jail terms of two to six years for violations.

Penalties need to be high enough to make the violators feel that the saving from their exploitation of the coastal environment, if they are caught, is not worthwhile. This will put pressure on the tourism-business investors to comply with such laws.

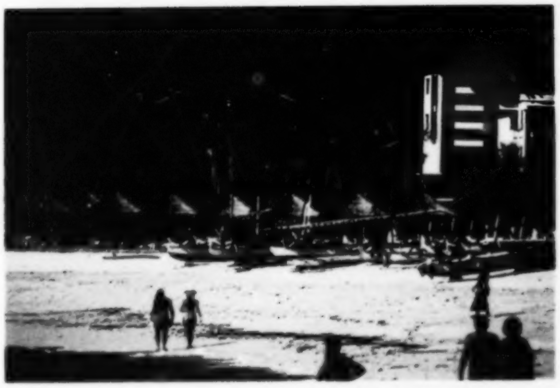
C. Institutional measures

(1) Institutional coordination

In each of the case study countries, there is a National Tourism Organization (NTO) e.g. Directorate of the Tourism in Indonesia, Tourism Authority of Thailand, Departments of Tourism in Fiji and the Philippines, Ministry of Tourism in Maldives and Ministry of Arts Culture and Tourism in Malaysia. Responsibilities and roles of these NTOs' are clearly defined in the terms of tourism promotion. Separate agencies or departments of Environment (DOE) also exist in these countries to appraise the EIA reports.

In Maldives, environmental aspects of the resort islands are managed by the Ministry of Tourism in consultation with the Ministry of Planning and Environment. In Fiji, the Director of Town and Country Planning is responsible for tourism development above high water mark, the area below it is subject to the control of Director of Lands and Surveyor General. In the Philippines, the Department of Tourism is the national tourism organization and Department of Environment and Natural Resources is the institution on environmental management.

It is a paradox that the environmental management or control of tourism is not the clearly defined responsibilities of one agency and is considered as sideline work by the implementing agencies on tourism as well as environmental management department. The problems of planning and implementing environmental management measures will therefore only be lessened in the tourism sector if the gray zones are converted into black and white areas by allocating direct responsibilities. The first important requirement in this direction would be to make tourism promotion organizations also agencies of primary responsibility for its sustainable development. However institutional coordination should be established so that monitoring and enforcement agencies could assist them properly in the process.



Nusa Dua, Bali: a planned tourist resort

Moreovcer, there is a need to place a clear and accurate monitoring system of the location, number, or types of permits issued for tourist related developments in the coastal zone. Its absence can lead to serious environmental problems and unsustainable tourist resort developments. In order to avoid this situation a division in the existing national tourism organization needs to be organized or established to function as a monitoring, and enforcement agency for the integration of environmental considerations into tourism management and development.

(2) Human resources development

Qualified environmental management personnel are badly needed in most of the countries of the ESCAP region. This is one of the most out-cried hindrance. For example Ministry of State for Population and Environment and Environmental Impact Management Agency of Indonesia and Departments of Environment in Malaysia face serious constraints in recruiting technically qualified full-time staff. The situation is even more critical in Fiji and Maldives. Human resources development through training, in environmental management tools and methodologies such as carrying capacity estimation, EIA and monitoring and assessment as well as on integration of environment and development through the use of economic instruments and natural resource accounting is therefore imperative.

(3) Strengthening local administration

Environmental problems caused by tourism related activities can take place at any time. Although the officials from the central agency or ministry may have more expertise for monitoring or protecting marine environment, it is impractical and uneconomical to solely rely on the central officials. (Although it is widely reported that even the central departments in many countries suffer from inadequate staff and resources). Therefore, the roles and authorities of the local administration, municipality, sanitary district, or whatsoever entities, should be strengthened.

Among case-study countries, the Philippines has recently devolved regulatory and local development authority to the local government units (LGUs) in line with the provision of the new Local Government Code 1992 leaving the Department of Tourism to focus its role on policy formulation, planning, marketing and promotion, standard setting and coordination. It is a positive development because the local government officials are more familiar with local conditions, residents and projects. However, currently they lack expertise, funds and equipment-all of which the Government should provide gradually, together with more authority.

It is highly desirable that the countries in the ESCAP region should also encourage the local authorities to effectively protect the coastal environment in their own jurisdiction while the expert from central agency may undertake periodical monitoring on sample basis as a supplement to the work of local entities.

The local officials are familiar with their surrounding and development but they lack expertise and knowledge to effectively manage the coastal environment. A typical case in point is an extract from Fiji's country case-study which states "The monitoring of sewerage treatment plants also causes some concern as these are inspected by local health inspectors, who have not been trained or appropriately qualified to examine the plants. As a result improper waste disposal into the marine environment has caused health problems".

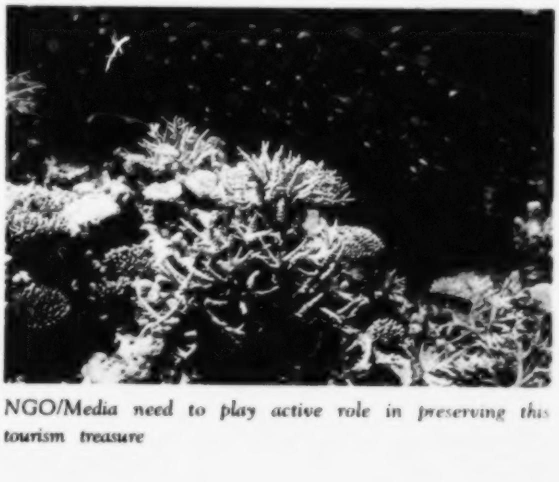
The lack of expertise is also evident in the disposal of solid waste as in most resorts it is done by burn and bury methods or dumping into the mangrove areas. Therefore, workshops/training on environmental management should be organized for the local officials annually, or as frequently as possible on important aspects of day to day environmental management.

(4) Supporting roles of NGO and media

Awareness creation is the basic ingradient of any effort on prevention of environmental damages or losses from tourism to the environment. Non-governmental organizations (NGO) have multiplied in the countries of the ESCAP region in recent years. The environmental Protection Society of Malaysia, Environmental Management and Research Associate of Malaysia (ENSEAR), Consumer Association of Penang and the Malayan Nature Society are some examples of such groups in Malaysia. Similarly, there are 57 university-affiliated environmental studies centers (PSLS) and more than 400 environmentally-oriented NGOs in Indonesia. The Philippines and Thailand also have hundreds of such NGOs. Besides creating public awareness on the need for promotion of sustainable tourism, these can also serve as public watchdogs to monitor continuously alarming situations which could result in adverse impact on the environment.

Knowledge about the environment has also been incorporated into the curriculum in the formal education in most countries of the ESCAP region. The student and youngsters therefore have at least some understanding of the environment. However, some tuned-up understanding, needs to be built through mass-media such as newspaper, radio, television, magazine, etc. The short-cut strategy is to educate local NGOs and community for enhancing their understanding in the dynamics of coastal environment. These organizations could then supply relevant information to those engaged in the public mass-media circles-columnists, reporters, television anchorman, disc-jockeys, etc., for creating awareness and promoting actions against unsustainable development. Seminars, workshops or meetings on sustainable management of coastal environment which are organized by government agencies and private sector should also encourage participation of the mass-media for wider dissemination of their recommendations.

Undertaking environmental awareness campaign is also one of the most needed measures to gear the public and tourists thinking and understanding in the desired



NGO/Media need to play active role in preserving this tourism treasure direction. Awareness campaigns of this type, especially on "do" and don't habit, will gradually lessen and eventually prevent the problem from taking place. The Magic Eyes Anti-littering Campaign in Thailand is a good example among many other which has greatly facilitated control of littering in Thailand. A checklist of various measures discussed here has been given in table 3.6.

D. Other support measures

Although tourism earn a big share of GNP, tourism organizations in many countries of the ESCAP region countinue to attribute shortage of funds to be the main factor responsible for inadequate supply of public utilities and infrastructure and lack of environmental management in the major coastal tourist destinations. Taxes collected from the coastal tourist destinations are generally not returned for the development of tourism in those destinations on the justification that such taxes are indirect income, not specifically from tourism. Nevertheless, a substantial number of taxes are also direct and it is desirable that at least a certain percentages of these, such as hotel tax, should be earmarked specifically for betterment of tourism environment itself through provision of public utilities and infrastructure and improvement of degraded ecosystems. This direct financial support will help rehabilitate, at least to a certain extent, the coastal environment.

Information and data concerning coastal environment in countries of the ESCAP region is either scanty

Table 3.6 List of measures to be taken for promotion of sustainable coastal tourism development

Measure	Responsible agency	Effect of measure
1. Planning Measures		
1.1 Incorporation of environmental zoning into tourism development plan	Government	Preventive
1.2 Studying carrying capacity of each individual coastal destination	Government	Preventive
1.3 Setting standard for beach resort development control	Government	Preventive
2. Legislative Measures		
2.1 Introduction of law/regulations for protected areas establishment	Government	Preventive
2.2 Issuance of land-use zoning regulations	Government	Preventive
2.3 More stringent on EIA requirement	Government	Preventive
2.4 Increasing penalties or fines on the violators	Government	Preventive
3. Institutional Measures		
3.1 Setting up monitoring and environment agency	Government	Preventive
3.2 Increasing qualified staff	Government	Preventive Remedial
3.3 Strengthening roles of local authorities	Government	Preventive Remedial
3.4 Supporting NGO's roles	Government Private	Preventive Remedial
4. Other Supporting Measures		
4.1 Educating the mass media	Government Private	Preventive Remedial
4.2 Encouraging private, NGO and mass media circles in environmental awareness campaign	Government Private	Preventive Remedial
4.3 Organizing annual workshop training on environmental conservation for local officials	Government Private	Preventing
4.4 Earmarking some percentage from hotel tax or airport tax to subsidise infrastructures provision in the destinations	Government	Remedial Preventive
4.5 Promoting research, and carrying capacities studies	Government	Remedial Preventive
4.6 Tax exemption for pollution control equipment	Government	Remedial Preventive

or collected in an unsystematic manner. This hinders calculation of tourism carrying capacities at specific destinations. It is therefore important that while encouraging the studies and researches concerning coastal environment, appropriate database should also be established.

Measures are also needed to muster cooperation in environmental management from investors. One such measures could be tax exemption on pollution control equipments such as incinerators, recycling plants etc. Another could be tax exemption on environmental investments. Not all tourism-business investors are selfish and unscrupulous. They may be willing to cooperate if being encouraged to install pollution-control equipments like waste treatment plant and garbage incinerator in the hotel.

A summary of recommended measures to be taken for protection and enhancement of coastal environment in tourism context has been provided in table 3.6.

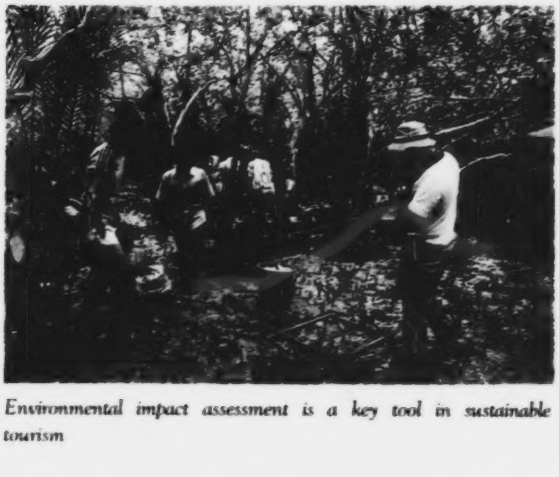
IV. MANAGEMENT THROUGH EIA

In the Asian and Pacific region, many countries have been making efforts to promote effective and efficient implementation of EIA as a basis of environmentally sound and sustainable development. They have developed various EIA systems in their respective countries through either legislative or administrative measures.

Among case-study countries, Malaysia has had an Environmental Quality Act since 1974. EIAs became mandatory for certain economic activities when the Environmental Quality on Prescribed Activities (EIA) Order 1987 came into force on 1 April 1988. Two of the four types of resort and recreational development specified as prescribed activities are related to coastal tourism. The first involves the construction of coastal resort facilities or hotels with more than 80 rooms. The second involves the development of tourist or recreational facilities on islands whose surrounding waters are gazetted as national marine parks.

Department of Environment in Malaysia published a handbook on EIA guidelines, which includes a checklist of the prescribed activities during various phases, related to planning and implementing of resort and recreational projects including investigation, development and construction, operational and post-operational phases.

In Thailand, EIA is applicable to hotels of 80 rooms or more. Government agencies such as the Ministry of Science, Technology and Environment, together with the Office of the National Environment Board (now Department of Environmental Quality Promotion) and the Ministry of Industry has set environmental guidelines related to beach tourism to address issues such as refuse disposal, surface water quality, wastewater treatment and vehicular noise.



Environmental impact assessment is a key tool in sustainable tourism

The EIA System adopted by the Department of Environment and Natural Resources in the Philippines (DENR) has two components, the EIS (environmental impact statement) requirement for environmentally critical projects (table 4.1); and the project description (PD) requirement for projects to be located in environmentally-critical areas (table 4.2). Generally, tourism development projects located in tourist zones or environmentally critical areas fall under the project description requirement, but there are instances when a full EIS is required e.g., when environmental impacts are significant. Thus two types of documents are produced under EIA system of tourism projects in Philippines namely project description (PD) and Environmental Impact Statements (EISs). A PD gives a description of the project activities and presents a preliminary examination of their likely environmental impacts. An EIS document gives a more in-depth studies of environmental impacts and addresses the ways and means for their possible mitigation.

The Indonesian EIA system is an integrated review process designed to coordinate the planning and review of proposed tourism development projects as a complement to the evaluation of technical and economic feasibility. The process is designed to result in the preparation of environmental monitoring and management planning which are intended to provide an operational basis for implementing and enforcing the fundings and conditions which emerge from review process.

In Maldives all major tourism development project are required to carry out EIAs which are examined by the Ministry of Planning and Environment and

Table 4.1 Environmentally critical projects in the Philippines

Heavy industries

- Non-ferrous metal industries
- Iron and steel mills
- Petroleum and petrochemical industries including oil and gas
- Smelting plants

Resources extractive industries

- Major mining/quarrying
- Forestry
- Fishery

Major infrastructures projects

- Dams
- Power plants
- Reclamation projects
- Roads and bridges

Table 4.2 Description of environmentally critical areas in the Philippines

- Areas declared by law as national parks, watershed reserves, wildlife preserves and sanctuaries.
- Areas set aside as aesthetic potential tourist spots, indigenous Philippine wildlife (flora and fauna).
- Areas of unique historic, archaeological or scientific interests.
- Areas which are traditionally occupied by cultural communities or tribes.
- Areas frequently visited and/or hard-hit by natural calamities.
- Areas with critical slopes.
- Areas classified as prime agricultural lands.
- Recharge areas of aquifers.
- Water bodies characterized by one or any combination of the following conditions:
  - a. Tapped for domestic purposes.
  - b. Within the controlled and/or protected areas declared by appropriate authorities.
  - c. Which support wildlife and fishery activities.
- Mangrove areas characterized by one or any combination of the following conditions:
  - a. With primary pristine and dense young growth.
  - b. Adjoining mouth of major river systems.
  - c. Near or adjacent to traditional productive fry or fishing grounds.
  - d. Which act as natural buffers against shore erosion, strong winds and storm floods.
  - e. On which people are dependent for their livelihood.
- Coral reefs characterized by one or any combination of the following conditions:
  - a. With 50 per cent and above live coralline cover.
  - b. Spawning and nursery grounds for fish.
  - c. Which act as natural breakwater of coastlines.

approved in consultation with the National Commission on Environment which has representation from sectoral ministries, including tourism.

Fiji, in the absence of Environmental Impact Assessment procedure, faced serious problems in past, in the implementation of certain tourism projects. Fiji case-study pointed out specifically the case of Denarau Island Resort in this regard. In order to cope with the deteriorating environmental situation in this island during the construction stage of the project. The Department of Town and Country Planning had to use development control instrument (under the Town Planning Legislation) for conducting environmental impact assessment of certain activities for appropriate mitigation.

Many countries in the ESCAP region still do not require EIA of tourism development projects. This chapter therefore emphasizes the need for EIA for tourism development projects and provides guidelines on its use.

A. EIA of tourism projects: an introduction

EIA is basically a tool that enables prediction of the environmental consequences of a proposed development project. In more specific terms it examines:

- Problems, conflicts or natural resource limitations that may affect project viability;
- Potentially harmful effects to people, fauna, flora, soil, water, atmosphere, landscapes, cultural sites, adjoining land uses, etc. that are in the project area or affected by it.

In addition to predicting harmful effects, if any, EIA also helps in identifying procedures to mitigate them. The results of an EIA for a tourist project may reveal that:

- There are no resource limitations or harmful effects predicted, (thus the project may proceed as proposed and without amendment);
- There are limitations or harmful effects, but these can be avoided or greatly reduced by suggested alternatives, thus the project can proceed as amended in the light of EIA findings;
- There are moderate to major limitations or harmful effects that cannot be avoided but are nevertheless acceptable to the decision makers, thus the project may proceed;
- There are limitations or harmful effects that cannot be avoided or eliminated and are considered to be unacceptable, thus the decision makers decide to drop the project.

A well conceived and planned tourism project would fall into one of the first two of the above categories. It may be emphasized that EIA does not decide whether or not to implement a project. It predicts the likely environmental impacts of a project and presents them in a clear and concise manner to the decision makers, for their consideration and verdict on the proposal.

B. EIA costs and benefits

(i) EIA costs

EIA costs are generally reckoned to be 0.5-1 per cent of total project costs. This is a small price to evaluate project i.e. whether it is environmentally acceptable, or conversely, if it is unacceptable. Such expenditure should be built into project costs from the outset and should not be considered as "extra" or "additional". The EIA may propose additional costs to lessen or prevent damaging environmental impacts. Invariably, such additional costs, if necessary, would be less than undertaking remedial actions after project implementation.

The environmental impact assessment cost of tourism development project may vary considerably depending on its size and nature. Commonly tourism development projects in the coastal areas of ESCAP region are commercially based and are being implemented by private sector, government, and non-government organizations; public enterprises; and sometimes, joint ventures of two or more of the above sectors for substantial financial return. Therefore, allocating a small share as EIA cost should not pose any problem for the project proponents.

(ii) EIA benefit

EIA carries substantial economic, social and environmental benefits. It has been primarily developed to overcome the serious limitations in the traditional economic and technical evaluation which were unsuitable for environmental purposes. Although, EIA is intended primarily to identify and mitigate impacts which will result from development but it can fill in many other roles in project planning, including efficient utilization of natural and human resources in economic development. EIA can also aid better coordination and cooperation between agencies. In tourism projects as it requires inputs from different sectors under the coordination of one individual or agency. EIA can, hence, act as a coordinating device for inter-agency cooperation.

The purpose of an EIA a tourism project is simple — to make sure that potential environmental problems are identified and solved at an early stage in the project development. It is rational because:

- It is easier and more economical to identify and rectify environmental problems before the project is implemented;
- Environmentally unacceptable projects are not implemented, thereby saving money, effort and protecting the environment;
- A badly planned and implemented project may degrade its environment to such an extent that the viability of the project itself may be threatened. This is particularly relevant to tourism projects that are specifically intended to exploit areas of outstanding beauty and natural interest e.g. beach, reef, etc.

Tourism puts great demand on sea resources

- Tourism projects designed to suit local environments are more likely to be completed on time, within budget and avoid problems during and after construction;
- Tourism projects that satisfy their objectives without environmental problems bring credit to the developers and the country.

C. Institutional involvements in EIA

(i) Who should do the EIA work

EIA is normally undertaken and financed by the developers, be they private sector or government agency. The team (of one or more people) that does the EIA must be competent to do so. This ability would normally be shown by past similar work and/or proven technical/academic expertise in the issues involved.

The team that does the EIA must be acceptable to both the project developer and government reviewing agency. Ideally, the team members should be independent consultants commissioned by either the developers or government agencies in order to view the project from neutral point of view. However, with competent and reputable developers and reviewers such a condition may not be absolutely necessary.

(ii) Who wants to know about the EIA

Besides the team that actually does the EIA, a large number of groups have a direct interest in the study. These include:

- **The developer:** requires full information on environmental aspects of his project and any procedures necessary to reduce harmful ones;
- **The reviewers/competent authority:** to enable them to decide whether to allow the project to proceed;

- **The investors:** need to know that the project is environmentally viable and sustainable to ensure returns on investment;
- **Government agencies:** implications of the project (if any) on their sectoral interests;
- **Local community:** impact (if any) on their way of life;
- **Politicians:** wider national and political issues and concerns;
- **Specific groups:** societies and clubs (e.g. cultural, religious, scientific) who are concerned with various aspects of the project.

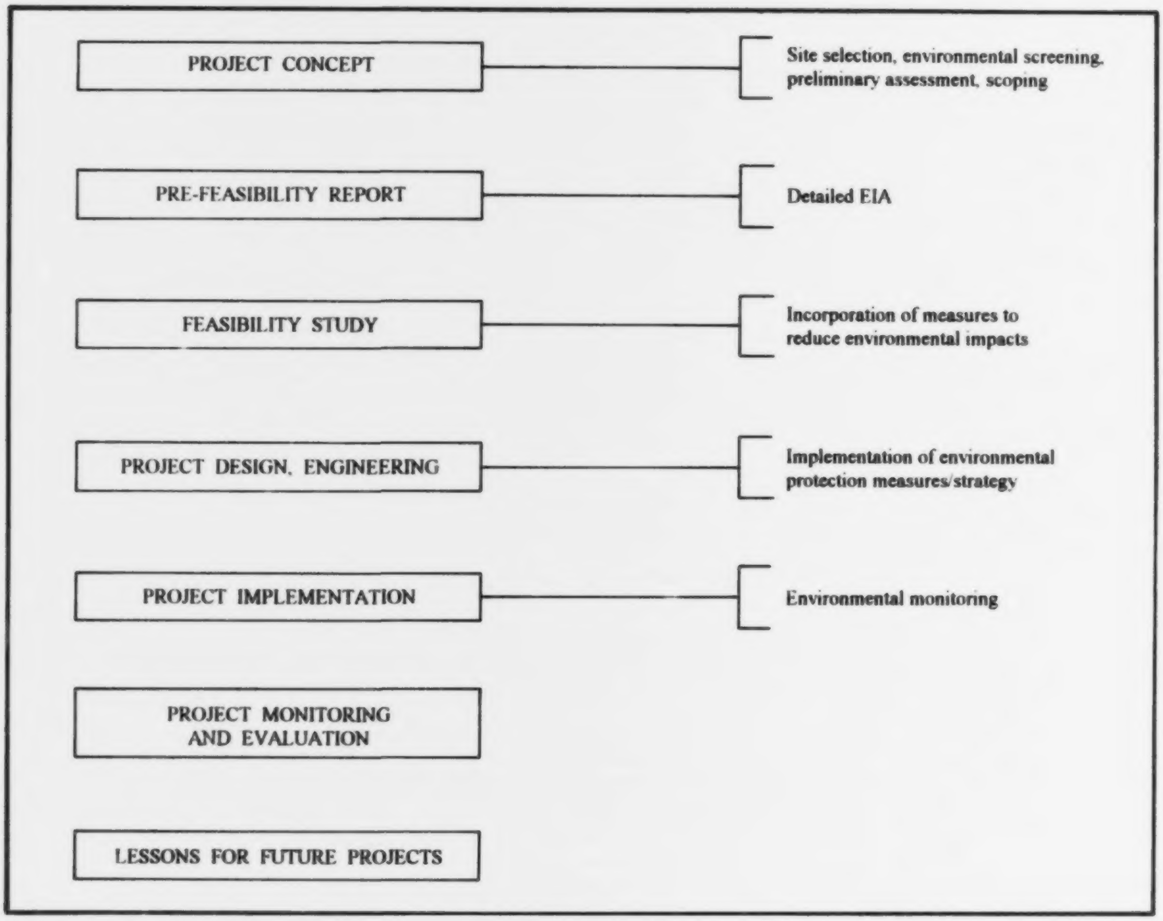
All of these people will be interested in the results of the EIA. If this is properly conducted they should be invited to participate in it.

D. EIA and project cycle

EIA should be viewed as an integral component of the project cycle, not as an extra to it. It is part of the information required by decision makers to enable them to arrive at sound conclusions concerning project implementation. EIA should be incorporated into the project cycle from its beginning and contribute to it until its completion and even during the management or operational phase (figure 4.1). In tourism related projects it would mean that the impact of large-scale package tours should also be subjected to EIAafter the construction/development of resort.

The EIA should begin at the pre-feasibility stage of a project. For some projects, this will be the only assessment required as initial considerations will reveal a full EIA to be unnecessary.

Figure 4.1 Project cycle and EIA

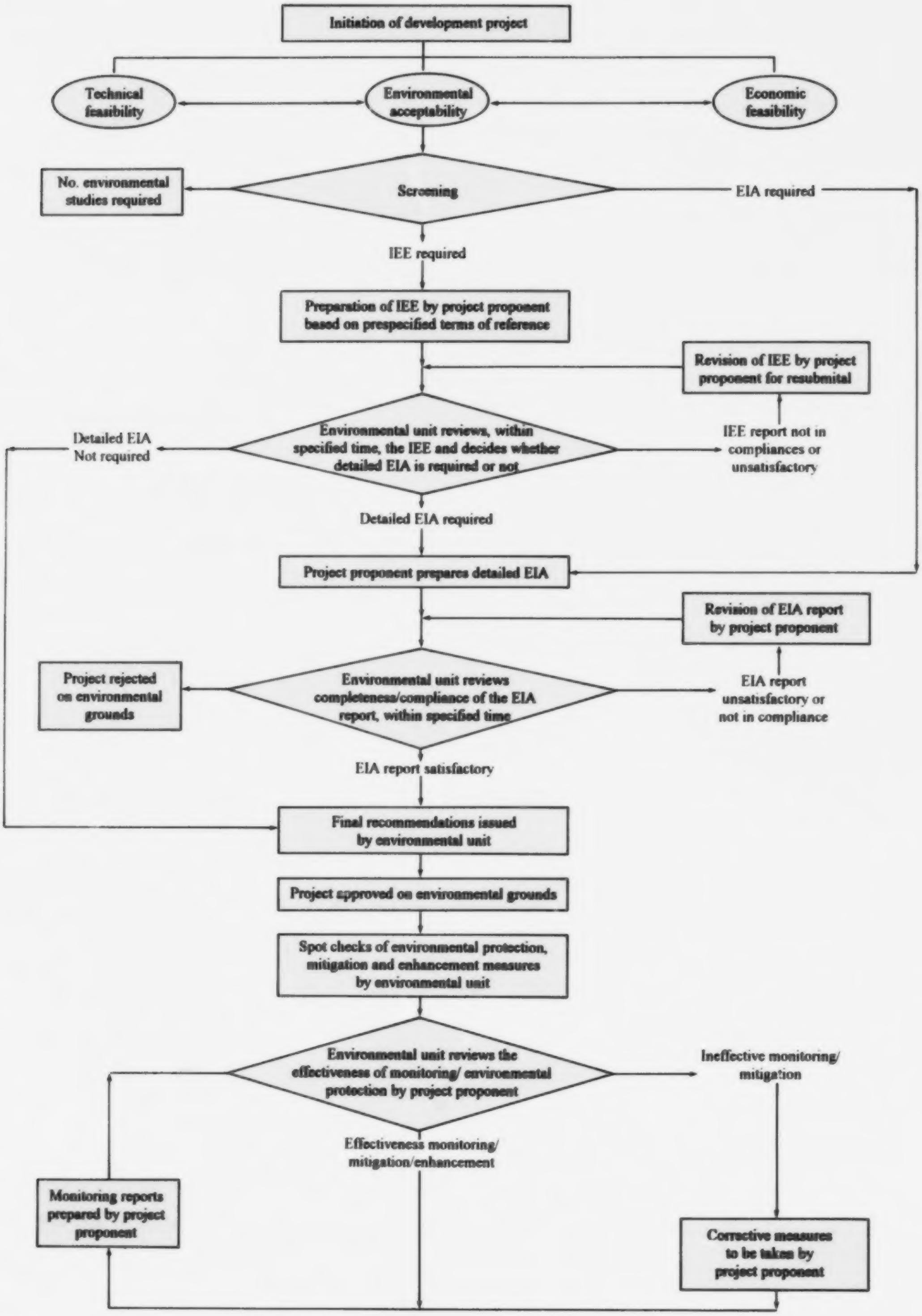

PROJECT CONCEPT
Site selection, environmental screening, preliminary assessment, scoping
PRE-FEASIBILITY REPORT
Detailed EIA
FEASIBILITY STUDY
Incorporation of measures to reduce environmental impacts
PROJECT DESIGN, ENGINEERING
Implementation of environmental protection measures/strategy
PROJECT IMPLEMENTATION
Environmental monitoring
PROJECT MONITORING AND EVALUATION
LESSONS FOR FUTURE PROJECTS

Source: Tourism Council of the South Pacific, "Guidelines for the Integration of Tourism Development and Environmental Protection in the South Pacific," Fiji, 1990, p. 42.

E. EIA process

EIA process in terms of sequential action has been given in figure 4.2 and some important principles in managing an EIA of a tourism project are given in box 4.1. The process has two 'tiers' of assessment. The first tier comprise screening and preliminary assessment or initial environmental examination (IEE). Where the first tiers of assessment are a regulatory requirement, the developer

Figure 4.2 Sequential actions of EIA as a management tool in tourism development projects


Initiation of development project
Technical feasibility
Environmental acceptability
Economic feasibility
No. environmental studies required
Screening
EIA required
IEE required
Preparation of IEE by project proponent based on prespecified terms of reference
Revision of IEE by project proponent for resubmital
Detailed EIA Not required
Environmental unit reviews, within specified time, the IEE and decides whether detailed EIA is required or not
IEE report not in compliances or unsatisfactory
Detailed EIA required
Project proponent prepares detailed EIA
Revision of EIA report by project proponent
Project rejected on environmental grounds
Environmental unit reviews completeness/compliance of the EIA report, within specified time
EIA report unsatisfactory or not in compliance
EIA report satisfactory
Final recommendations issued by environmental unit
Project approved on environmental grounds
Spot checks of environmental protection, mitigation and enhancement measures by environmental unit
Environmental unit reviews the effectiveness of monitoring/ environmental protection by project proponent
Ineffective monitoring/ mitigation
Effectiveness monitoring/ mitigation/enhancement
Monitoring reports prepared by project proponent
Corrective measures to be taken by project proponent

Box 4.1 Important Principles in Managing EIA of a tourism project or a resort

* Focus on the main issues

EIA should not go into unnecessary details and focus on most likely and most serious of possible environmental impacts. Its finding must be readily accessible and immediately useful to decision makers and project planners.

* Involve appropriate persons and groups

Generally, three categories of participants are needed to carry out an EIA.

- Those appointed to manage and undertake the EIA process (usually a coordinator and a staff of experts).
- Those who can contribute facts, ideas or concerns to the study, including scientists, economists, engineers, policy makers, and representatives of interested or affected groups.
- Those who have direct authority to permit, control or alter the project, such as the decision makers — including for example the developer, aid agency or investors, competent authorities, regulators and politicians.

* Link information to decision about project

The information should directly support decisions that need to be taken about the project. Therefore, the process should start early enough to provide information to improve basic designs, and should progress through the several stages of project planning in a typical sequence:

- When the developer and investors first broach the project concept, they consider likely environmental issues.
- When the developer is looking for sites or routes, environmental considerations are used to aid the selection process.
- When the developer and investors are assessing the projects' feasibility, and EIA is in progress, it should help them in anticipating problems.
- When engineers are creating the project design, the EIA identifies certain standards for the design to meet.
- When a permit is requested, a completed EIA report is submitted and also published for general comments.
- When the developer implements the project, monitoring or other measures provided for in the EIA are undertaken.

* Present clear options for the mitigation of impacts and for sound environmental management

- To help decision makers, the EIA must be designed so as to present clear choices on the planning and implementation of the project, and it should make clear the likely results of each portion.
- When mitigation measures are being suggested it is important to focus the study only on workable, acceptable solutions to the problems. It is easy for the study to waste time considering measures that are impractical or totally unacceptable to the developer or to the Government.

* Provide information in a form useful to the decision makers

- The objective of an EIA is to ensure that environmental problems are foreseen and addressed by decision makers. To achieve this, decision makers must fully understand the EIA's conclusions. Most decision makers are unlikely to use information, no matter how important it is, unless it is presented in terms and formats immediately meaningful.

normally does the work and submits the results to the regulatory agency. The agency may then decide:

- There is nothing to be concerned about, or
- The evaluation should proceed to the next tier which is a full scale Environmental Impact Assessment.

The advantage of a tier approach is that the extent of the inquiry expands with the advancing development of the project plans. 'Screening' is appropriate when the project is only a rough concept. Later, when the project is under more general discussion, a 'preliminary assessment' can look deeper into possible sites and potential impacts. Then, just before the preliminary stages of feasibility and design work get underway, a full 'EIA study' can commence, so that it can influence the detailed decisions to come. The tier approach also ensures that impacts are examined at a very early stage in the project planning, and not later when sites or designs are already decided by other factors.

(1) Screening

The process entails project proponent to identify impact for examination by the Government. Screening is intended to identify projects that have minimal environmental impact and therefore do not require a full EIA. Screening is done by evaluating the project against the following criteria:

- Scale: small-scale projects may not require an EIA. Large-scale ones usually would. However, it should never be automatically assumed that even a small project does not need an EIA. Thus a project to build three or four chalets on a beach may appear to have little potential environmental impact. The location chosen though, could be particularly valuable for the conservation of a rare species and an influx of visitors may be harmful; the site may be liable to natural disasters such as landslides, floods, storm inundation or local residents may be strongly opposed to the project.
- Location: if the area affected by the project is particularly valuable or environmentally sensitive in any way (e.g. supports rare/endangered species, or is agricultural or fishing area for local villagers), then an EIA is required.
- Impact extent: easily foreseeable impacts likely to be restricted to a small area may mean that the project does not require an EIA. Impacts over a large area would indicate that it does. The effects of a tourist development, through secondary effects, such as visitations over a large surrounding area, should be considered.
- Impact durability: short-term impacts, though severe, may be acceptable. The same impact of long duration may not and therefore would indicate that an EIA is required e.g. temporary erosion leading to reef damage may be acceptable during site construction. A long-term erosion threat would not be acceptable, and if it is suspected, then an EIA is required.

The screening process should be submitted as part of the pre-feasibility report. If it shows little or negligible impacts, in the opinion of the Government agency responsible for its assessment, then the project may be allowed to proceed. If the Government agency is in any doubt about its conclusion, then it should consult other experts, for example, other Government departments, universities, international organizations, etc.

(2) Initial Environmental Examination (IEE)

If the screening process does not automatically clear a project, the developer should undertake an Initial Environmental Examination or preliminary assessment.

This is similar in nature to screening, but requires more detailed information to be presented by the developer to:

- Identify the project's key potential impacts on the local environment e.g. pollution, loss of aesthetics, conflict with other land uses, threats to species of scientific or subsistence importance;
- Describe and predict the extent, severity, permanence of these effects;
- Evaluate their significance in terms of local, provincial and national importance.

If required, this preliminary assessment could also be a part of the pre-feasibility planning and the results may be submitted to the decision makers. The preliminary assessment may also show that the project has no major environmental impacts. However, if otherwise than a full scale EIA is required.

(3) Full-scale EIA

The first stage in the implementation of a full EIA is to plan for its organization. This entails commissioning and briefing the EIA team. The leader and team members (if more than one) must reflect the expertise needed to investigate the likely environmental impacts of the project e.g. a marine biologist for marine impacts, pollution expert for pollution impacts. The EIA team should work to specific terms of reference, which should be prepared by a scoping exercise.

Scoping ensures that the EIA considers all the environmental aspects of potential importance for a full consideration of the project. The scope (extent) of the EIA is determined at this preliminary stage in discussions with project developers, government agencies, local communities and other interested parties. On the basis of these discussions and its own perceptions, the EIA team selects the major likely impacts to focus in the study. After this initial scoping exercise, which should include preliminary site visits, the EIA proposal can begin.

The EIA study attempts to answer five questions:

- What will happen to the natural and social coastal environment as a result of the tourism project;

- What will be the extent of the changes;
- Do the changes matter;
- What can be done about them;
- How can decision makers be informed of what will happen and what needs to be done.

To consider these questions fully, a great deal of information may need to be collected and evaluated by the EIA team. Although the type of study may vary according to the nature of the tourism project (see box 4.2), the following would normally be needed for a major project:

(a) Description of the development activity

- Reasons for the project: how does it fit in with national requirements and objectives, as outlined in National Development Plan or Tourism Master Plans;
- Competence of the developer to fulfill these objectives, technical and financial;
- Direct benefits expected e.g. services, jobs, financial return to local and national economy, nature protection;
- Location and extent of the project, including secondary tourism considerations;
- Brief description of the project buildings and associated development (e.g. number, size, style and capacity of buildings);
- Additional local infrastructures required e.g. jetties, roads, paths, airstrips, power supplies, telephones, health and educational facilities;

Box 4.2 Type of tourism project in Asia and the Pacific

In terms of size and nature, tourism projects in Asia and the Pacific can be categorized by varied criteria such as (i) the types of services and goods to be provided including accommodation, food and drink, transport, access to scenic areas, recreational facilities etc. (ii) type of occurrence of tourism resources; (iii) tourist activities; and (iv) the level of investment. The accompanying table elaborates these schemes of classification.

It is clear that among various project multipurpose resort or mega-resort development schemes (MPRD) are commonly implemented in the region to cater for groups and individuals concerned with the full scope of tourism-related activities in coastal areas and are liable to have several environmental impacts. Therefore they definitely require conduct of full scale EIA. However, it should not be assumed that other projects being small are harmless. Construction of even small recreational centre or promotion of boating in an environmentally critical areas (such as those with rear and endangered species) could be extremely damaging and therefore even these must be subjected first to at least preliminary environmental assessment and it needed to full scale EIA.

Classification of some major tourism development projects in the ESCAP region

TDP	(i) Services/goods	(ii) Tourism resource	(iii) Tourist activity	(iv) Level of investment
Hotel	Accommodation Restaurant Bar Other	Coastal	In-house entertainment Sports/games Shopping Other	4-star 2-star No. of rooms Associated facilities to suport (i) and (iii)
Marina	Recreational	Coastal	Yachting Sailing Boating Ferry	Variable and depends on demand
Multi-purpose resort development (Denarau island resort, Fiji)	Accommodation Recreation Restaurant Shopping Convention centre Other	Coastal	Sports/games (Golf course) Sightseeing Relaxation Sailing Yachting Others	Depends on extent of needs for (i) and (ii) (For Denarau island – 300 million dollars)

A road for tourists cuts through forests

- Labour and resource requirements, and whether these are locally available;
- Number and duration of phases in the implementation process.

(b) *Description of existing environmental conditions*

- Present land uses in the area e.g. forestry, agriculture, nature reserves;
- Location and size of human settlements in the area;
- Social and cultural conditions of the area;
- Physical conditions and natural resources; geology, soils, climate and weather pattern, landforms, water resources, flora, fauna, scenic resources or aesthetics, cultural sites.

(c) *Prediction and evaluation of changes to the environment*

- Which of the existing environmental conditions (above) will be affected by the development — improved or worsened;
- Will predicted changes lead to conflicts with or breaking of existing legislation (e.g. pollution, site protection);
- In what ways and to what extent will human health welfare and culture be affected;
- In what way and to what extent will existing natural resources be affected.

(d) *Actions to reduce any harmful impacts*

- Feasible alternatives to the proposed development that will reduce or eliminate predicted harmful impacts but still enable objectives to be realized e.g. pollution control, waste treatment, phased implementation, landscaping, personnel training, new social services, species protection, public education, guidelines for visitor behaviour;
- If alternatives are not possible, should the project be re-sited;
- If re-siting is not possible, should the project be abandoned;
- Is compensation required for people whose natural resources are unavoidably degraded.

(e) *Sustainability*

- Description and evaluation of any irreversible loss or damage to the natural environment, cultural sites, green spaces and scenic beauty etc;
- Comparison of impacts (good and bad, short or long) with impacts on human welfare and environmental conditions, e.g., short-term harmful impacts such as erosion could precede long-term benefits from tourism, or short-term benefits from temporary jobs may lead to long-term harm such as loss of local culture with no adequate replacement.

(f) *Findings and recommendation*

- What is known about the environment and with what level of accuracy;
- What relevant information could not be located;
- What could and should be known with more time/money;
- Recommended course(s) of action as a result to the EIA for consideration by the decision makers;
- Proposed monitoring of the project to detect environmental and/or human impacts — what needs to be done and by whom.

Shelterbelt, an essential feature to save wind erosion in coastal resorts *(g) Consultation*

Individuals and agencies consulted for their expert information/advice/opinions. Some of these views may be listed.

(h) References

All reference works used should be fully cited and referred to in the text where appropriate.

F. EIA methodologies

The techniques for evaluating and presenting the impacts of proposed and ongoing activities under the tourism development project on the environment are numerous. These methodologies display variety in conceptual framework, data format and data requirements as well as manpower, monetary, and time/resource requirements. One of the common misconceptions is that only one of the general assessment methodologies need be used in EIA of a project. The fact is that for projects which have very diverse and widespread impacts, the EIA team may wish to utilize several methods.

(1) Types of EIA methodologies

Broadly EIA techniques and methods can be divided into the following major groups.

- Check lists
- Matrices
- Networks
- Overlays
- Environmental indices
- Cost-benefit analysis
- Simulation modelling workshop or adaptive environmental assessment and management.

(a) Checklists

Checklists are lists of environmental parameters or impact indicators which the environmental analyst is encouraged to consider when identifying potential impacts. Checklists, in general, are strong in impact identification and are capable of bringing them to the attention and awareness of their audiences (table 4.3). Impact identification is the most fundamental function of an EIA and in this respect all types of checklists, simple, descriptive, scaling and weighting checklists, do well (ESCAP, 1985).[6] However, simple and descriptive checklists offer no more than just this. They merely identify the possible potential impacts without any sort of rating as to their relative magnitudes. As a result they are most applicable at the IEE stage of an assessment.

(b) Matrices

An environmental matrix is an extension to the use of a checklist in that it employs a list of project activities in addition to a detailed list of environmental characteristics or impact indicators. The two are related in a matrix in order to identify cause-effect relationships. Column headings generally list the project activities while the row headings show the environmental characteristics of the affected system. Entries in the resulting matrix cells may simply show that an interaction takes place (the simple interaction matrix) or they may be qualitative or quantitative estimates of the interaction (quantified and/or graded matrices).

(c) Networks

Networks are extensions of matrices and were first proposed for use in environmental assessment work by Sorensen (1971).[7] The approach involves the development of a "stepped matrix" of "cause-condition-effect network" to indicate the nature of environmental interrelationships. The network is in the form of a tree, called a relevance of impact tree. It is used to relate and record secondary, tertiary and higher order impacts (figure 4.3). To develop a network requires answering a series of questions related to each of the project activities, such as: what are the primary impact areas, what are the primary, secondary and tertiary impacts within these areas, what are the secondary impact areas and what are the primary, secondary and tertiary impacts within these areas and so on. For example, the development of a tourist resort may involve construction of holiday camps with an air strip. This development could lead to forest removal. The primary impact in this case could be loss of forest. The secondary impact could be loss of habitat for biodiversity. The tertiary impact could be discruption of food chain or web in the area etc.

(d) Overlay mapping

The essence of the method involves the use of superimposed transparencies to identify, evaluate, compare and communicate impacts in a geographical reference frame. The study area is divided into a number of environmental factors (e.g., topography, vegetation distribution, ecologically sensitive areas, etc.). Sub-national/local maps are prepared for common factors showing their areal extent and value. All of the maps prepared in this way are made into transparent negatives, superimposed and photographed. The resulting composite map shows the simulation of

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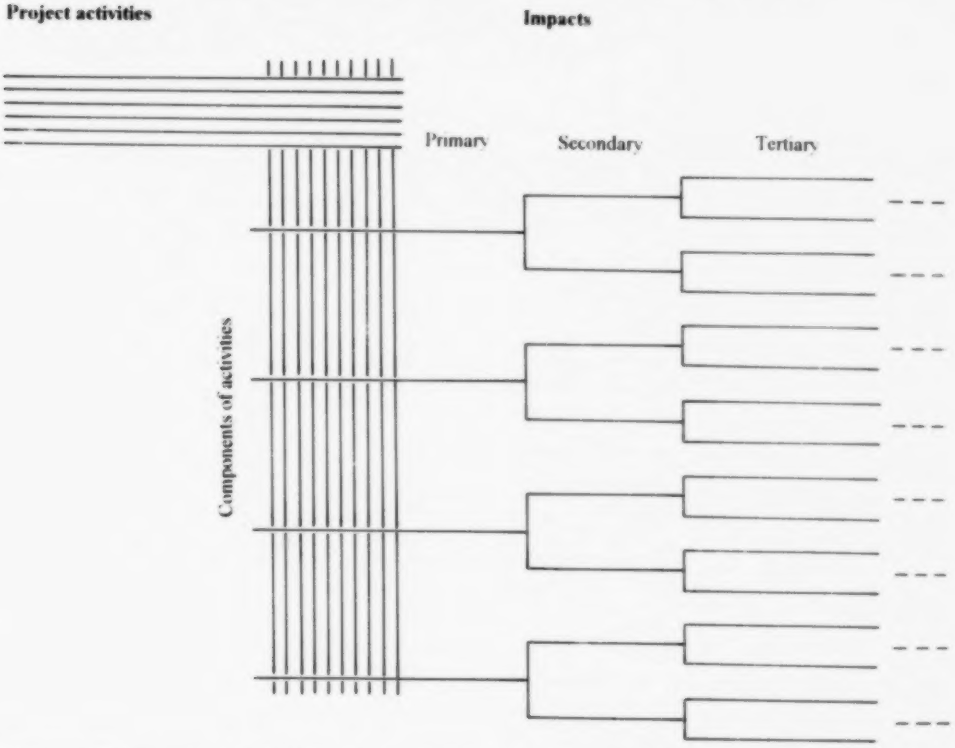
[6] ESCAP (1985), "Environmental Impact Assessment" Guidelines for Planners and Decision Makers," Bangkok.

[7] Sorensen, J.C. (1971), A Framework for Identification and Control of Resource Degradation and Conflict in the Multiple Use of the Coastal Zones, master's thesis, University of California, Berkeley.

Table 4.3 Check list for beach front hotel development impact: short-term

Activity	Consequence to environment	Natural resources impacts	Social/cultural impacts	Mitigation
Dredging/disposal of dredge spoils	Turbidity run-off Sedimentation Benthic destruction Dredge spoil	Water quality degradation and damage to ecology, especially corals Habitat destruction and species loss Toxicity 1. Ocean disposal – Species loss 2. Land disposal – Leachate damage	Public health risk 1. Ciguatera correlation Welfare losses 1. Subsistence 2. Recreation 3. Economic (fisheries, tourism) Loss of potentially productive land Aesthetics	Design and siting – Avoid high-quality areas Siltation controls 1. Silt curtains 2. Settling ponds 3. Appropriate technology Productive use of dredge spoil Compensatory habitat enhancement
Site clearance/grading	Denuded landscape Altered soil profile Altered topography Altered drainage characteristics	Soil erosion Water quality degradation Habitat destruction and species loss Increased runoff Increased risk of land slippage Degraded and coastal surface Instream and coastal habitats/species loss	Destruction of cultural resources 1. Archaeological sites Welfare losses 1. Subsistence 2. Recreation 3. Economic (fisheries, tourism) Loss of potentially productive land Cultural displacement Aesthetics Catastrophic risk 1. Flood 2. Loss of landform stability	Design and siting – Avoid sensitive areas Archaeological survey/excavation Grading controls 1. Drainage berms 2. Settling basins Relocation of displaced population Avoid stockpiling in natural swales Revegetation Grading controls 1. Drainage berms 2. Settling basins
Construction activities	Noise Fugitive dust Machinery emissions Congestion/traffic Structural addition to coast and landscape Fertilizer/pesticides	Disturbance of endangered species Toxicity: species/habitat loss Water quality degradation Eutrophication	Worker safety Public health risk 1. Respiratory irritation Welfare losses 1. Quality of life 2. Subsistence 3. Recreation Aesthetics	Noise and emission control ordinances Toxic substance controls Timing to avoid migratory or spawning season Compensatory enhancement
Labour importation	Immigrant worker population Sewage Temporary housing	Water quality degradation	Public health risk 1. Disease introduction 2. Sanitation problems Overburdening of infrastructure Overburdening of public facilities Cultural conflicts Loss of labour from productive sectors	Minimize contact between temporary workers and local people Construction of housing adequate for post-construction period Infrastructure enhancement integrated with project design
Landscaping	Introduction of exotic species Fertilizer/pesticides Temporary structures	Displacement of indigenous, rare endemic species Toxicity: species/habitat loss Downstream eutrophication Prevent access to beach	Natural/cultural resource loss Welfare losses 1. Subsistence 2. Recreation 3. Economic (fisheries, tourism) Aesthetic	Use of native plants Management of chemical products Proper planning

Figure 4.3 Stepped matrix used in network method for EIA



Source: Environmental Management for Developing Countries Volume 3: Environmental Assessment and Management. Asian Institute of Technology, 1983.

all the values employed and thus the suitability of the area for a given activity. Similar maps are then prepared for the other development activities under consideration. Overlays are useful in site and route selected for example in construction of tourist transport systems and utility lines for water supply, sanitation and electricity transmission for serving the tourist resort.

(e) Environmental impact indices

A number of approaches are being developed which attempt to derive an overall rating or index for evaluating the environmental impacts of a project. A factor analysis-based environmental index approach for assessing impacts, for example, is a useful technique in that it enables the grouping and clustering of parameters and components that are complex in nature. However factor analysis is useful only when there is some sort of meaningful variation in the data set on hand. Without this, only one factor can be derived from a data set and the factor analysis exercise losses its significance and potential.

(f) Cost-benefit analysis

Cost/benefit analysis provides the nature of expense and benefit accruable from a project in monetary terms, as is common practice in traditional feasibility studies, and hence enable easy understanding and aids decision-making tremendously.

The difficulty encountered in the use of this technique has been that environmental impacts have to be transformed and stated in explicit monetary terms. This is not always possible, especially for intangibles such as the monetary value of the damages to human health owing to the noise and pollution resulting from new transport development for tourism or for impact on quality of life values.

(g) Simulation modelling workshop

System analysts have developed and approach to environmental impact assessment and management commonly referred to as adaptive environmental assessment and management (AEAM), which combines various simulation models to predict impacts. This approach, which broadens the potential of simulation models to evaluate the impacts of alternatives, is beneficial for project planning.

(2) Selection of methodologies

The EIA analyst, or the team charged with the preparation of an EIA report, is faced with a vast quantity of raw and usually unorganized data. Hence, each technique and method for the evaluation of impacts should have the following qualities and characteristics.

1. It should be systematic in approach;
2. It should be able to organize a large mass of heterogeneous data;
3. It should be able to quantify (relatively accurately) the impacts;
4. It should be capable of summarizing data;
5. It should be able to aggregate the data into sets without loss of significant information because of the aggregation;
6. It should have a good predictive capability;
7. It should extract the salient features;
8. It should be able, finally, to display the raw data and the derived information in a meaningful fashion.

Different methodologies for the assessment of environmental impacts of development projects have their own advantages and disadvantages and their utility for a particular application is largely a matter of choice and judgement of the analyst (table 4.4). Nevertheless, in general some objective criteria exist in making the choice of methodology in the context of coastal tourism development in the countries of the Asian and Pacific region. These include:

— Simplicity: The methodology should be simple so that the available manpower with limited background knowledge can grasp and apply it without much difficulty.

— Manpower, time and budget: It should lend itself to being applied by a small group with limited budget and under time constraints.

— Flexibility: It should be flexible enough to allow for modifications and changes through the course of the study, especially when more detailed examination is later required.

G. Presentation of the EIA

The EIA must be presented clearly and in a format acceptable to the decision makers, who in many cases will be non-specialists and people not technically qualified in many of the issues presented. Thus the EIA should avoid overly technical language and be reasonably brief. Imaginative visual aids should be used which should not be too technical. Complex graphs and tables should be avoided, but could be put in appendices if considered essential. The report should not praise or condemn the proposed project excessively and should include a separate executive summary of the findings and recommendations.

Table 4.4 Summary of current EIA methodology evaluation

Criteria	Checklists	Overlay	Network	Matrix	Environmental index	Cost/ benefit analysis	Simulation modelling workshop
1. Comprehensiveness	S	N	L	S	S	S	L
2. Communicability	L	L	S	L	S	L	L
3. Flexibility	L	S	L	L	S	S	L
4. Objectivity	N	S	S	L	L	L	S
5. Aggregation	N	S	N	N	S	S	N
6. Replicability	S	L	S	S	S	S	S
7. Multi-function	N	S	S	S	S	S	L
8. Uncertainty	N	N	N	N	N	N	S
9. Space-dimension	N	L	N	N	S	N	S
10. Time-dimension	S	N	N	N	S	S	L
11. Data requirement	L	N	S	S	S	N	N
12. Summary format	L	S	S	L	S	L	L
13. Alternative comparison	S	L	L	L	L	L	L
14. Time requirement	L	N	S	S	S	S	N
15. Manpower requirement	L	S	S	S	S	S	N
16. Economy	L	L	L	L	L	L	N

Legend L = Completely fulfilled, or low resource need.
S = Partially fulfilled, or moderate resource need.
N = Negligibly fulfilled, or high resource need.

Source Environmental Impact Assessment: Guidelines for Planners and Decision Makers, United Nations Publication ST/ESCAP/351, ESCAP, 1985.

(1) How to review the EIA

The technical competence and completeness of the report can often be reasonably assumed. However, in some specialist areas of which the reviewers have little technical expertise themselves, it would be advisable to check with experts, particularly from government agencies.

When reviewing the EIA individuals or committees should be asking themselves some or all of the following questions:

- Are both beneficial and adverse environmental impacts clearly presented, explained and evaluated;
- Does the EIA cover all impacts of the tourism project, including those secondary impacts that may arise in the surrounding areas;
- Does the EIA consider a reasonable time scale and not just the construction phase;
- Are there any impacts on areas of wildlife interest, endangered species, recreational areas for local residents, cultural sites, aesthetics of the area;
- If damaging impacts are predicted, what suggestions are made for alternatives to reduce these impacts;
- Are comparisons made with other similar tourism projects;
- Are there any unavoidable adverse impacts and how significant are these;
- During the EIA preparation, have all interested groups and individuals been consulted;
- Have all interested groups and individuals been given the opportunity to comment on the completed EIA;
- How is the project to be monitored for environmental effects during and after implementations.

Generally, large tourist projects will have significant impact magnitude while small tourist projects may have small. As stated earlier the large-scale tourism projects and mega-resorts usually require full scale EIA and it is reasonable to assume that their proponents will have sufficient capital associated with the project to pay for this. Developers of such large projects are also resourceful enough to develop contact with government agencies to plan with them the EIA procedures, implementation and review. Such considerations of finance and contacts however may present problems for small developers, particularly if they are indigenous landowners in comparatively remote areas. Nevertheless such people should carry out EIAs if needed because the whole process can greatly assist them to plan and execute their project sustainably. In many cases, screening and preliminary assessment will show that a full EIA is not even required for a small project.

As an aid to small, local developers, experts in relevant government agencies e.g. primary industries, cultural centres, fisheries, forestry, environment, public works, tourism, should be prepared to give assistance at no or nominal costs. The rationale for this is that planned and sensible development is the objective of all government agencies and thus they must do all in their power to promote this.

(2) Statement format of EIA

EIA results are presented in the form of a statement. A generalized simple format of such a statement has been outlined below:

FORMAT OF AN ENVIRONMENTAL IMPACT ASSESSMENT STATEMENT OF FIJI

i. Name of proposal: (To include name or relevant part of larger proposal). Stage of commitment: State whether at the concept planning or design stage.

ii. Objectives and options:

   (a) State the purpose (s) of the action proposed.

   (b) State the options open to achieve the purpose defined; and the advantages and disadvantages of each option in terms of the objectives.

iii. Description of proposal

   (a) Describe the proposed action and include the necessary technical data, photographs, maps and other information relevant to an assessment of the environmental impact of the proposal.

   (b) Give reasons (environmental, social economic; etc) for following the action proposed, including where relevant explanations for site selection and the choice of locality.

iv. Description of existing environment

   (a) Give a general description of the characteristics and condition, in qualitative and quantative terms of the physical, biological and human environment prior to the implementation of the project. This should include a definition for the purposes of the report of the spatial boundaries within the environment which is expected to be effected by the proposal.

(b) To the extent, to the assessment of the environmental impacts of the proposal, describe the geology, soils, flora and fauna, water quality, climate, hydrology. The functioning of the ecosystem of other aspects of the physical or biological environment. Any environmentally sensitive areas of special or unique scientific, socio-economic or cultural values, including any endangered species or important habitat types should be fully described.

(c) Describe the relevant aspects of the existing human environment including land use, community patterns, manmade facilities and activities etc.

v. Impact of the environment

In considering the possible environmental impacts - of the proposal; the following aspects should be fully - assessed.

(i) Adverse and/or beneficial effects;
(ii) Primary and secondary effects;
(iii) Unavoidable effects;
(iv) Immediate short-term effects;
(v) The probability of an effect occurring; and
(vi) Whether or not any changes are irreversible or will offer or consume in irreplaceable resources.

In each case the magnitude, intensity and significance of the effect is to be assessed and arrears of uncertainty identified.

The new amenities, if any, created by the proposal should be identified.

vi. Safeguards

(a) Identify the safeguards incorporated in the proposal to prevent or minimize adverse environmental effects.

(b) The possible of remedial measures being taken later in the life of the project should be examined.

(c) The environmental effects of the safeguards should themselves be evaluated.

Crown of thorn fish, a great threat to corals in coastal resorts

(d) Any additional safeguards which have been considered but which are not recommended and the reasons for this should be stated.

vii. Summary and conclusions

(a) Appropriate conclusions should be drawn in each section of the EIA report. Summarize the environmental impact of the proposal and the steps that would be taken to minimize adverse environmental effects.

(b) State the recommendation (s) which the project proposes wishes to make to the decision — making authority.

viii. Monitoring

State any monitoring activities that will be undertaken during the operation of the project.

ix. Consultation

Individuals and agencies that have been consulted for their expert views and advise or opinion should be listed, and wherever possible, their written views and/or recommendations attached to the report.

x. References

Any reference work or scientific/technical papers used in the environmental study should be listed.

xi. Responsibility for the report

The report should be dated and signed by the representative of the proposer who is to take full responsibility for the content.

The format provided is not meant to be rigid but open to modification of content and detail according to the type of statement being prepared, and to the nature and scope of the proposal being examined.

While deciding on the content and coverage of an impact statement care should be taken to ensure that advice is sought from appropriately qualified experts. A detailed case-study of EIA of a Tourism Development Project in Malaysia is given in annex III and guidelines for EIA of an existing hotel is provided in annex IV.

H. Management and evaluation

Usually, the EIA is undertaken at the cost of the proponent of a project under the guidance and supervision of appropriate government agency/ministry dealing with environmental matters. Such government agency/ministry is expected to have the necessary manpower and expertise to advise whether a project would need a preliminary environmental study or a detailed EIA, and to examine EIA reports critically and advise project proponents of mitigation measures and effective monitoring. To aid the review and assessment of environmental impact statements, environmental agencies issue guidelines for the preparation of the same, resulting in somewhat uniform format.

Generally, the management of an EIA consists of five phases, namely: (1) EIA and preparation of EIS by project proponent; (2) circulation of the EIS documents; (3) public hearing, if necessary; (4) formal approval of EIS; and (5) monitoring and post-auditing.

Preparation phase has already been covered in detail in the previous sections, a public hearing phase is usually conducted at the review stage based on, but not limited to, any of the following; substantial environmental, social or economic impacts; the magnitude of the proposed project in terms of economic cost; the commitment of resources or geographic area; the wide response to the project as shown by the number of requests from government agencies and interested parties as well as strong manifestations by environmental defence groups or non-governmental organizations. No doubt, public hearing enhances popular opinion and stimulates public awareness of the significance of environmental issues.

After the approval of EIA reports, various measures are taken to ensure the reflection of EIA findings and conclusions in the project design, construction and operation. A typical example of such measures is the preparation of environment management plans and environmental monitoring plans. Such documents are required in Indonesia. In other countries, due consideration of EIA findings and conclusions is taken by lead/permitting agencies when they approve or permit the proposed projects. Furthermore, some countries conduct post-EIA monitoring and/or inspection, as and when considered appropriate.

Post-EIA monitoring (figure 4.3) is used as feedback by the national executing agency and by the National Environmental Protection Agency for purposes of evaluating the project's actual performance in affecting environment, compared to performance projected at the time of project appraisal, and as the basis for modifying the project facilities or its operating regime as needed to overcome unacceptable degradation which may have been occurring or may occur (see annex IV for an example).

I. Constraints in EIA implementation

Since the introduction of EIA in the Asian and Pacific region the following constraints in the implementation of EIA have been noted:

(i) Insufficient awareness on the part of decision makers, and in particular, politicians, regarding environmental problems;

(ii) Legal and institutional constraints owing to inadequate arrangements for EIA implementation;

(iii) Shortage of expertise and experience, particularly lack of skilled manpower. Among the countries selected for case-study, Malaysia has a relatively better EIA system. However, even in that country the Department of Environment is grossly understaffed for enforcement of EIA. The present strength of professionals to manage EIA, and the number of staff in other regional offices is far from sufficient and the growing number of EIA reports is exerting a stressful pressure on the EIA personnel.

(iv) A major criticism and complaint from the developers as well as the consultants is on the delays and slow progress in the review process. Delays in approval of projects are due to several reasons. A common factor, however, is awaiting additional information. This information may be: request for additional socio-economic data and studies, more data and statistics on noise or further details on project description. Whatever it is, this additional information can be critical and a delay in their supply is understandable. However, very often the information required is thought to be not so critical. It is complained that it is this type of request which results in unnecessary delays in EIA approval.

Sending EIA reports to other agencies for comments is another cause of delay. Other agencies do not see the urgency in reviewing these reports as they are also bogged down with their own departmental work.

(v) Difficulty of access to the latest technical information on EIA;

(vi) Lack of appropriate environmental data and information required for EIA.

J. Recommendations to overcome constraints

The following measures could assist in overcoming these problems and constraints:

(i) Organizing seminars/workshops on environmental issues in order to promote awareness of decision makers and politicians on EIA;

(ii) Transferring EIA from a system of administrative measures to a more authoritative one;

(iii) Taking steps through administrative instructions to avoid unnecessary delays in the projects subject to EIA;

(iv) Convening regular meetings of sectoral departments with lead/permitting agencies and, in some cases, project proponents, in order to promote EIA procedures and methodologies among them;

(v) Developing explicit regulations, guidelines and other documents in both procedural and technical terms, to supplement official and legal documents;

(vi) Developing systematic training programmes on EIA, and conducting them regularly. The ability to review EIA reports rapidly and efficiently depends much on the skills of the officers experience and attitude towards their job. Therefore, education and training is a fundamental requirement for the successful implementation of the EIA procedures.

(vii) Establishing a registration system for EIA experts, for either EIA studies or EIA reviews;

(viii) Promoting exchange of information and experience on the implementation of EIA among developing countries;

(ix) Making the necessary information regarding EIA clear, and providing details on the sources of such information.

(x) Developing databases and information relevant to EIA, including data on the state of environment, reports prepared on EIA and manuals on EIA methodologies. This data and information bank could facilitate EIA process substantially.

(xi) Environmental monitoring and auditing must be incorporated into the EIA as a compulsory requirement. Under the present practice environmental monitoring is often the task of project initiators and the environmental auditing is carried out by the officers of the Departments of Environment who are already overburdened and have little time to perform the task effectively. It is imperative to strengthen the capabilities of the Departments of Environment to cope with the present requirement otherwise environmental auditing and monitoring would be conducted only on an ad hoc basis and selectively or would not be conducted at all.

V. TECHNICAL GUIDELINES FOR ENVIRONMENTAL MANAGEMENT

The impacts generated by tourism-related activities in the management of coastal environment, have to be checked and remedial and preventive measures have to be undertaken to avoid the situation reaching irreparable stage. The focus of this chapter is to provide the guidelines to control the adverse impacts on environment from tourism and other related activities through undertaking technical measures.

A. Technical guidelines on water pollution control

Water pollution seems to be the most prevalent and critical problem emanating from fast growing coastal tourism in the ESCAP region. The control and management of water pollution, is therefore essential, which can be carried out in various stages.

Choosing and designing of the most appropriate systems for any particular tourism project is a technical matter (particularly that of sewage treatment) best left to the architects/engineers. However, the proper consideration of waste disposal should be fully covered in the EIA, and should usually be a major component of it.

This section intends to provide some information on potentially damaging effects of water pollution to assist national agencies responsible for reviewing tourism proposals in their work. Additionally, guidelines are also provided to enable the decision makers to assess whether the project proposal has fully and adequately considered waste disposal and related aspects for sustainable development of coastal tourism.

(1) Causes of water pollution

Water pollution is caused, mostly, by sewage which is the combined liquid wastes from toilets, sinks, swimming pools, kitchens, laundries, etc. Such wastes consist of about 99.9 per cent water (by volume), but still have considerable potential to cause a range of adverse environmental effects. The harmful potential depends upon how much waste there is, how it is treated and how it is disposed of. Dangers in sewage water can arise principally from the presence of organic compounds, nutrients, pathogens and toxic substances.

(i) Organic compounds: When released into the environment, even after treatment, waste waters contain organic compounds. Once released, these compounds are broken down by bacteria. The bacteria require oxygen to do this, and consequently the amount of oxygen in the water is reduced. If large amounts of effluents with high organic contents are released into fresh or marine waters, then the subsequent bacterial action can cause an extreme depletion in oxygen levels resulting in the death of fish, corals, plants etc. This is particularly likely near effluent disposal points and in enclosed water such as lagoons and lakes.

The amount of organic material in effluents is quantified by measuring its biological oxygen demand (BOD). The BOD indicates how much oxygen is required for the bacterial decomposition of the contained organic material. Two objectives of sewage treatment/disposal are to reduce the BOD by rapidly diluting it or removing the effluents and disposing these in areas where there is no danger to fish and other sea life.

(ii) Nutrient salts: Sewage effluents contain fertilizing chemicals such as phosphates and nitrates. These can cause excessive fertilization of receiving waters and lead to unwanted and damaging growth of both large and microscopic plants. This is particularly likely to happen in enclosed areas such as bays, lagoons and near coral reefs. The latter are very susceptible to increased plant growth and can be smothered by them. Increases in numbers of microscopic plants (suspended in the water) cause the water to become turbid (resulting in loss of aesthetics) and can also reduce the light over reef areas so much that the corals may get killed.

(iii) Pathogens: Sewage contains disease causing organisms such as pathogenic bacteria, proto-

Waste treatment is becoming a major feature of planned tourist resorts zoa and viruses. Hence it must be released in such a way as not to contaminate domestic water supplies. The risk of contamination from pathogens is usually estimated by measuring the faecal coliform levels. Faecal coliform are bacteria present in the human intestine. They are harmless in themselves, but a measure of their concentration indicates the degree of faecal contamination and therefore the risk of disease carrying organisms being present.

(iv) Toxic compounds: These will be present if chemical wastes are disposed of through the sewerage system.

It is important not only to monitor and assess these pollutants in the liquid wastes being disposed into the sea water but also to remove them through proper sewage treatment.

(2) Treatment of sewage wastes

The processing of sewage or liquid wastes may consist of up to five levels of treatment (figure 5.1), depending upon the quality of effluents present, the financial and technical resources available and project site characteristics. These five levels or stages are pretreatment, primary, secondary and tertiary treatments as well as disinfection.

Pretreatment. This level consists of the screening out or comminution of solids such as paper, plastic, rags and wood as well as grit removal. It has been considered sufficient in some ocean disposal situations where a long outfall to deep waters removes the wastewater from the shoreline and where adequate mixing and dispersion exist. (The process does not remove floatables such as oil which is done at the next level).

Primary. Primary treatment assists in removing floating and settleable solid materials. It also allows time for partial bacterial decomposition of organic materials. The process may remove up to 60 per cent of the suspended solids and from 25-50 per cent of the BOD and also reduces pathogens. The primary treatment is most commonly conducted in the settling or septic tanks.

Secondary. The reduction in BOD (up to 90 per cent and pathogens continues in secondary treatment, generally by forced aeration of effluents and solids in special tanks. A comparative analysis of some reliable secondary treatment methods is given in tables 5.1 and 5.2.

Tertiary. This stage of treatment involves addition of chemicals for the precipitation and removal of nutrients, heavy metals and other potentially harmful compounds. The recovered material obtained through

Figure 5.1 Examples of wastewater treatment systems

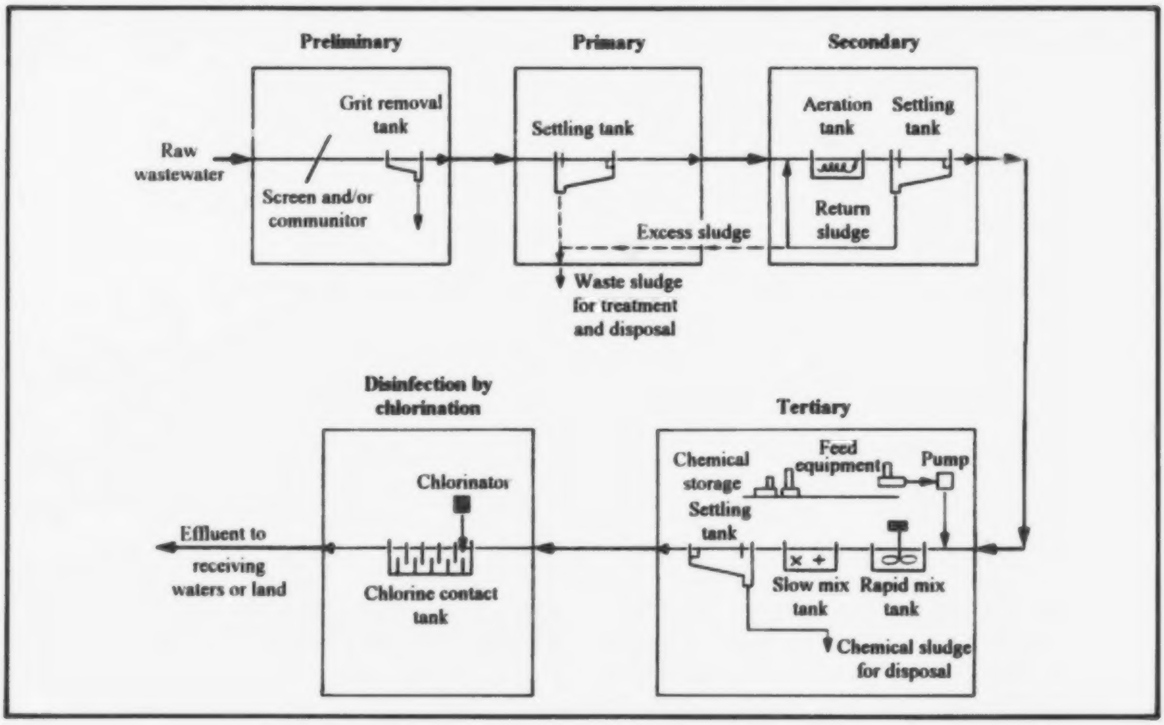

Preliminary
Primary
Secondary
Grit removal tank
Raw wastewater
Screen and/or communitor
Settling tank
Aeration tank
Settling tank
Return sludge
Excess sludge
Waste sludge for treatment and disposal
Disinfection by chlorination
Tertiary
Chlorinator
Effluent to receiving waters or land
Chlorine contact tank
Chemical storage
Feed equipment
Pump
Settling tank
Slow mix tank
Rapid mix tank
Chemical sludge for disposal

Table 5.1 Comparison of some reliable secondary treatment methods

Criterion	(Coarse bubble)	Activated sludge alternatives		Oxygen-activated sludge (Cryogenic)	RBC	Trickling filter
		Air-activated sludge (Fine bubble)	(Surface aeration)			
Energy consumption (kWh/kg BOD removed)	1.33	0.70	0.99	0.70	0.55	0.60
Complexity of operation	Moderate	Moderate	Moderate	High (oxygen plant)	Low	Low
Maintenance requirements	Moderate	Moderate to high	Moderate	High	Moderate	Low
Aerosol generation	Moderate	Moderate	High	Nil (with gas collection and combustion)	Low	Low
Technological sophistication	Proven technology	Proven technology; increasing use of low-maintenance diffuser with lower energy requirements	Proven technology	Proven technology; particularly applicable to high-strength wastes	Proven technology; particularly applicable to small- and medium-size plants (0.5-50 million l/day)	Proven technology
Relative capital cost ratio	17	16	13	17	27	17
Annual O and M cost ratio	0.59	0.47	0.55	0.65	0.45	0.55

Source: Data from UMA Engineering, Ltd.

Table 5.2 Typical efficiency and relative cost of different sewage treatment processes

Degree of treatment	Process components	SS	Sewage treatment efficiency (per cent removal)				Total phos-phorus	Total nitrogen	Relative cost ratio	
			No chlorination		With chlorination				Capital	Annual O and M
			BOD	Coliform	BOD	Coliform				
Preliminary	Screening, comminution and/or degritting	2	2	–	15-30	90-99	–	–	–	–
Primary	Sedimentation for settleable solid removal	40-65	25-35	45-55	40-48	99.9+	5-15	5-20	32	1.7
Secondary	Primary treatment + conventional activated sludge	85-95	85-95	90-99	88-96	99.99+	20-40	20-50	55	1.4
Tertiary	Conventional activated sludge + post-secondary tertiary works	90-95	90-95	95.99+	92-96	99.999+	80-95	25-55	65	1.6

Source: Data from UMA Engineering, Ltd.

the process is usually of very high quality, but requires expensive technology and trained personnel to achieve it.

Disinfection. It is the final stage of treatment whereby sewage water after going through the above processes is disinfected by using chlorine. As a public health measure, besides chlorination, many other disinfection alternatives are also available.

In some countries of the ESCAP region, such as small island states of the Pacific, secondary and tertiary treatment and disinfection of sewage may be difficult to attempt because these are expensive and depend upon complicated technology (particularly in the cases where faults may result in a lengthy process of repair). However, it could be considered ideal for the following situations:

- A large tourist resort with easy access to the skilled manpower required to operate it, maintain it and monitor effluent quality;
- A tourist resort in which the disposal of primary treatment wastes may not be practical due to insufficient land area, pollution potential or expense/difficulty of construction of ocean or other outfall.

In most island situations and many other beach resorts of countries in the ESCAP region, primary treatment of sewage in a septic tank systems followed by careful disposal of the effluent may be enough. The capacity of the septic tank, however, would need to be carefully estimated. In a hotel situation, for example, its total capacity should be estimated by including both visitors and staff. Guidelines for the design and operation of a septic system include:

- Septic tank systems should be installed above groundwater levels and in areas not liable to flooding by fresh or sea water;
- Stormwater systems must be separate from the sewerage treatment systems;
- The septic tank should have two compartments in which the first (receiving) tank is about twice the size of the second. This allows for better settlement of solids;
- Length to breadth ratio of the septic tank should be 2-3:1;
- Liquid retention time should be at least 24 hours. Thus the size of the tank depends upon the estimated daily wastewater flow. Since two-thirds of tank volume is taken up with accumulated sludge and scum, the size of the tank at the beginning should be 3 times the estimated daily inflow of wastewaters;
- The tanks should be located away from poorly drained areas;
- The septic tanks should be de-sludged when it is one-third full. Normally this would be at intervals of 2-5 years;
- The septic tank must be located away from wells, streams, embankments and cuttings. Its minimum distance (in metres) from various objects should be as follows:

Buildings	2
Property boundaries	2
Wells	30
Streams	10 increase to at least 60 if the tank is in a water supply watershed
Cuts/embankments watershed	10 increase to at least 60 if the tank is in a water supply watershed
Pools	3
Water Pipes	3
Paths	2
Large trees	3

Some of the important guidelines on septic tanks system installation are illustrated graphically in figure 5.2.

(3) Disposal of sewage wastes effluent after treatment

After treatment of the sewage it is also important to dispose of resulting effluents carefully, because from a public health point of view, it may be more dangerous than raw sewage. There are several alternatives that could be considered for its safe disposal as follows:

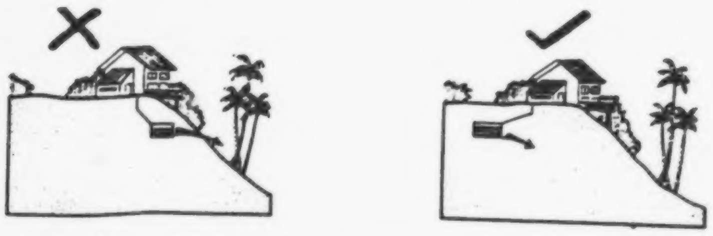
Ocean outfall: A pipe discharging septic tank effluent directly into the ocean is comparatively expensive to install, but thereafter is cheap to run. The siting of an ocean outfall should only be chosen after careful study. It should be deep (at least 30 metres), away from popular diving spots and so situated that currents and tides carry the effluent away from beach or lagoon. The dilution by seawater will minimize or eliminate pollution problems. Outfalls should not be located in lagoons, lakes, ponds or small rivers, though very large rivers may be permissible, with a dilution rate of at least 10 times during the period of lowest river flows.

Subsurface irrigation (drainfield): This is a common method of disposal for smaller projects in which the effluent is discharged directly into drainage trenches arranged in series. Each trench is made up of open-joint agricultural drainage tiles of 100 mm diameter laid on 1 metre depth of rock fill (20-50 mm grading).

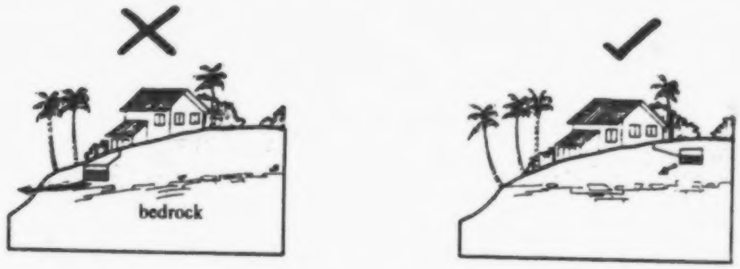
The length and number of trenches would depend upon the effluent volume and the permeability of the soil. This method of disposal demands that the soil must be sufficiently permeable, and this aspect must be investigated during the design phase of the project. It is also important to note that the trenches eventually become clogged with sewage solids and therefore the project site must have sufficient land available to establish new drain fields. The area needed will depend upon the size of the hotel/resort.

Figure 5.2 Illustrations on placement of septic system

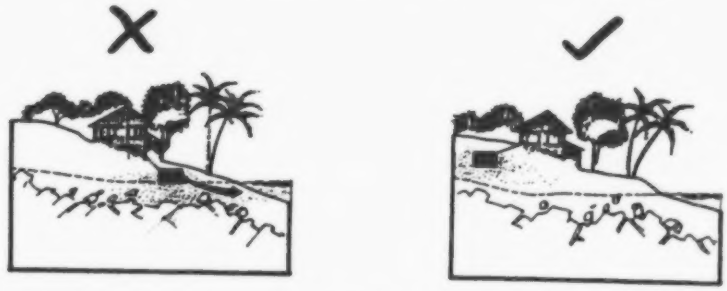
- **Placement of Septic Systems**



Septic systems should be placed a minimum of 15 feet from steep slopes (of 15 per cent or greater). Sewage entering the soil close to a slope will move too quickly to be adequately purified, and may come to the surface, creating unsanitary conditions.

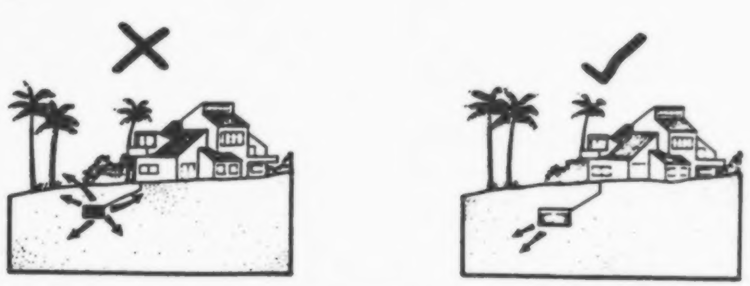


If bedrock is close to the surface, sewage may travel along shallow bedrock and through its fissures, coming to the surface before it has been adequately purified. Bedrock should be at least 7 feet below the surface. If the depth to bedrock is less than 7 feet, special design may be necessary. The bottom of the leaching trenches must be at least four feet above the bedrock surface.



Poorly planned SEPTIC SYSTEMS can be especially troublesome near the coastline. Since the water is usually close to the surface, wastewater may enter the groundwater before it is properly cleansed. Highly permeable sandy soils and relatively impermeable wetland soils require special consideration in design and may limit development sites; bedrock close to the surface may also cause problems.

- **Size of Septic Systems**



To function properly, septic systems must be large enough to handle the amount of sewage produced by the buildings they serve. Otherwise, inadequately puriffied sewage may reach the surface or contaminate water supplies. Leaching fields should also be of adequate size; dimensions vary according to soil characteristics.

Source: Colin Rees and H. Ramos, "A Guide to Development in Urban and Coastal Area", 1990.

This method of effluent disposal is not suitable for hotels/resorts that depend upon groundwater taken from close by reservoir. It is particularly unsuitable for a small island situation where water is obtained from the underground freshwater lens.

As with the septic tank, the drainage area in this method of disposal must not be located at poorly drained sites or in areas liable to flooding, otherwise impeded drainage will greatly restrict infiltration and could lead to contamination of surface waters. The following distances (metres) should be followed from the identified objects to avoid future environmental problems:

Building	3
Property boundaries	2
Wells	30
Streams	30 increase to at least 60 if the drainfield is in a water supply watershed.
Cuts/embankments	30 increase to at least 60 if the drainfield is in a water supply watershed.
Pools	10
Water pipes	3
Paths	2
Large trees	3

Evapotranspiration beds: In this method of disposal waste water is released in open-joint pipes below the the evapotranspiration beds which consist of a 20-50 cm layer of coarse sand and gravel beneath 10 cm of soil on which is planted a fast-growing grass. The effluent is taken up by the grass roots and water is lost through the leaves (transpiration) as well as evaporated from the soil surface. The nutrients and organic material in the effluent are used by the grass for growth. The size of the evapotranspiration bed needs to be carefully calculated.

The evapotranspiration bed must be located in areas of good drainage and should not be liable to flooding. To prevent flooding, the area should be surrounded by raised banks and/or trenches. Further, the dependence of the subsurface irrigation and the evapotranspiration methods of effluent disposal on suitably permeable soils, means that they cannot be used in areas of impermeable soils.

(4) Assessment of water pollution control measures in EIA

For hotel/resort projects, a consideration of adequate methods for water pollution control particularly the aspects of sewage treatment and disposal should be an important component of the EIA. Some guidelines are presented here to allow the decision makers to evaluate whether this problem has received sufficient attention in the EIA of water supply projects.

(i) Planning and design stage

Characteristics of the project area

Existing water sources and supply:

- Sources: distance and type;
- Quality: at source and at point of usage; sources of contamination; future possible sources of contamination;
- Quantity: flow patterns and trends.

Potential water sources:

- Sources: distance and type, quality and quantity.

Existing sanitation systems:

- Disposal of human and animal wastes;
- Social and cultural patterns;
- Community health, particularly for water-borne pathogens.

(ii) Project design

Demand for water supply:

Surface water sources — streams, lakes, rivers:

- Diversion system: dam, reservoir, tank;
- Conveyance system: canals, pipes, tunnels;
- Pumps, storage tanks.

Ground water source:

- Wells, pumps, pipe, storage.

Wastes treatment and disposal:

- Degree of treatment required, type of treatment proposed;
- Conveyance to treatment and/or disposal.

(iii) Construction stage

Materials:

- Quality and types required, whether locally available.

Methods:

- Land clearing (including burning);
- Surface excavation, including cut and fill;
- Blasting and drilling;
- Channel dredging/straightening;

- Erosion control and terracing;
- Landscaping.

Access roads (if any):

- Siting and control of use.

Environmental protection:

- Protection of existing water quality of rivers, streams, seawater and groundwater by means of adequate effluent disposal methods.
- Restoration of any areas disturbed during construction.

(iv) Operation and monitoring

Monitoring of water quality, particularly at, below and around points of effluent discharge. This should include coliform levels, species loss and/or gain, sediment accumulation, loss of water clarity etc.

B. Technical guidelines on water supply

Apart from waste disposal guidelines which should be imposed during the planning and construction stages of water supply and sanitation projects, some water quality standards should also be set up to continuously measure, assess and control the deteriorating coastal water condition. Water quality standards should be used as an index of the minimum acceptable condition of the coastal water suitable for human use. In Thailand and Malaysia, coastal water quality standards are already in place. Moreover, standard limits on effluents allowed to be discharged have also been set. The classifications and parameters used in the standards of two countries are somewhat different (annex IV).

There are two important aspects of water supply-quantity and quality. It is important to take effective technical measures on both to promote a sustainable supply of water for the development of coastal tourism. The quantity or capacity of water supply may often be limiting factor for the size of tourism industry in coastal and small island situations. Studies on carrying capacities in terms of water availability sometimes provide useful yardstick on the potential size of tourism development projects in such area. A study of this type was conducted in Ko Samui island, Thailand which used the available quantity of water supply in the area as a limiting indicator for tourism. Assuming that the expected amount of water supply available will be 5,000 cu.m./day for both tourist and local population, the study found that the maximum density of 14,200 tourists per day should be the highest number the island could support without any irreparable impacts. This approach and its assumptions, though not being the sole methodology, can be borrowed and adapted to develop plan for tourism in resort islands in terms of water availabilities within the region.

It is also important to utilize available fresh water from underground reservoirs judiciously as high pumping rates have led to depletion, contamination and salt water intrusions in many island and coastal countries such as Indonesia, Maldives and Thailand. Further, in order to save water supply sources from contamination it is also necessary to have careful placement of septic tanks, and design septic system in relation to soil and location of wells (See illustrations in the figure 5.3).

C. Technical guidelines on solid wastes disposal

Garbage or solid waste is another pollution problem constantly threatening environment of the coastal tourist resorts in the Asian and Pacific region. Its unsafe storage, collection, treatment and disposal can lead to both short and long-term risks, particularly pollution of water supplies by toxic chemicals and hazardous wastes.

Solid wastes disposed of improperly may result in insects infestation, fire, obnoxious odor, degradation of aesthetics and pollution. The collection and disposal of solid wastes should be so managed as to eliminate these hazards. The following guidelines are presented to assist in the evaluation of methods for solid waste disposal adopted by a hotel/tourist resort.

(1) Storage of waste

Various types of solid wastes should be separated into their major categories and stored separately. For example, food waste should be stored in containers with tight-fitting (airtight) lids, and stored outside in a specially constructed outhouse, which should be in a shady place, well-ventilated and secure from dogs and other scavengers. The floor should be of concrete (for ease of washing/hosing down) with drains connected to the sewage treatment system.

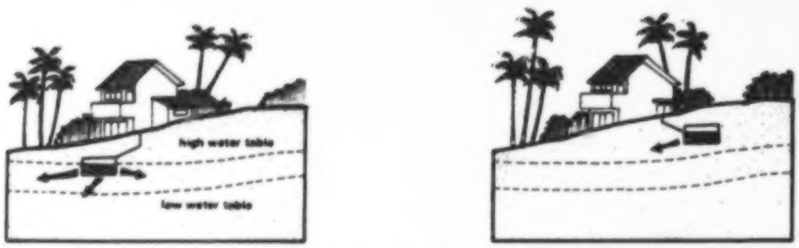
Paper and plastic waste should be stored separately in bins and containers with lids, preferably in a special outhouse (but not the one used for food wastes). Likewise, potentially damaging/dangerous chemical wastes such as pesticides, oil, bleaches, cleaning fluids should be kept in a special store that is well-ventilated and shady. This must be locked at all times. Bottles, metals and reusable material should be recycled.

(2) Collection of waste

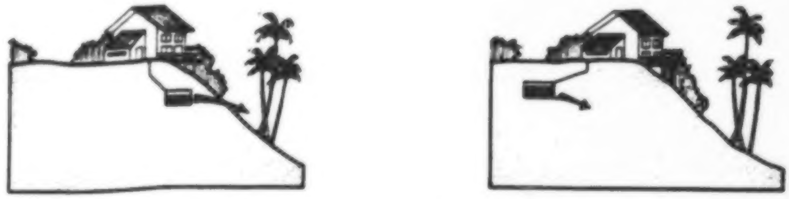
In hotels/tourism projects situated in urban areas, waste disposal is usually done by the local authority.

Figure 5.3 (a) Placement of septic system in relation to water supply sources

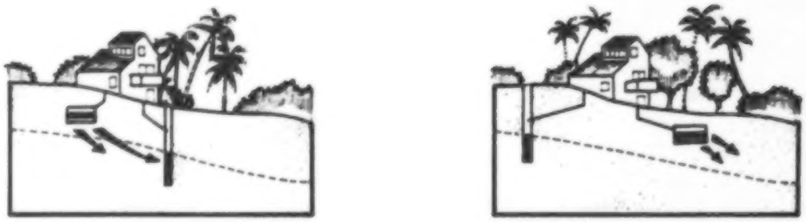
- **Placement of Septic Systems in relation to water supply sources**



A septic system installed above the water table during the dry season may be in or near groundwater when the rains come, allowing sewage to contaminate drinking water supplies. Systems should be installed in areas where the land surface is at least 10 feet above the low groundwater level and 4.5 feet above the high water.



Septic systems should be placed a minimum of 15 feet from steep slopes (of 15 per cent or greater). Sewage entering the soil close to a slope will move too quickly to be adequately purified, and may come to the surface, creating unsanitary conditions.



Drinking water can become contaminated by improper placement of septic systems. To ensure reasonable protection from contamination, residential water supply wells should be at least 75 to 100 feet from septic systems. If possible, leaching fields should be placed so that leachate flows away from nearby wells.

In areas close to but outside the normal collection area of the municipal authorities several options are available as follows:

- The hotel can deliver the refuse to a prearranged spot from which the authorities could collect it for disposal;
- The hotel can pay the municipal authority to make special trips to the establishment to collect the wastes for disposal;
- The hotel can deliver its own wastes to the dump site or have its own disposal system.

Although all these options will involve expenses, the first two options may be economical in that the hotel is saved the expense and bother of organizing its own waste disposal and treatment system. However in cases where it is not possible to make use of municipal collection and disposal, the hotel must arrange to have its own disposal system.

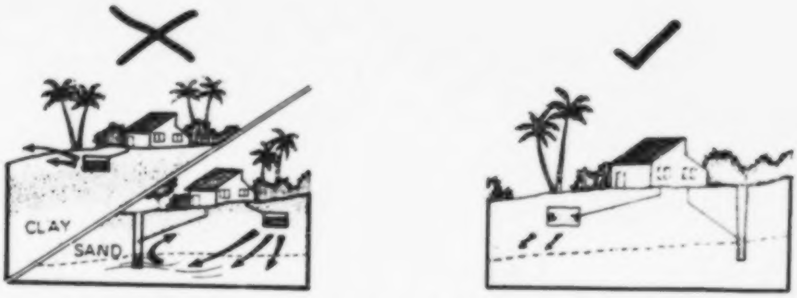
(3) Disposal of solid waste

Solid wastes disposal is of critical importance in maintaining environmental quality, and should be fully considered in the preparation and planning of a tourism project. As a guideline, the following aspects need consideration in this respect.

- Quality and nature of the wastes;
- Land available for disposal, including location, area and suitability;
- Technological options — methods involving complex technologies should be avoided in remote or isolated areas;

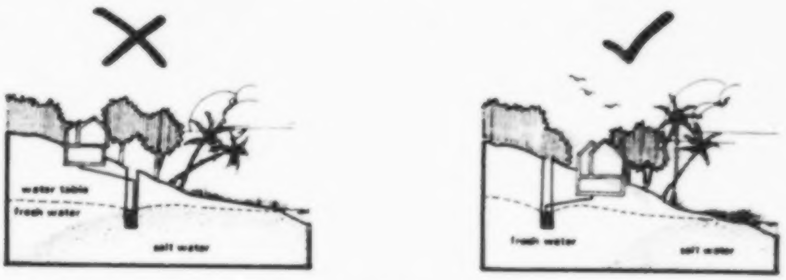
Figure 5.3 (b) Septic tank system design in relation to soil

- **Septic System Design in Relation to Soil**



Improper septic system design relative to soil characteristics often results in unsanitary conditions. Relatively impermeable soils such as clay may cause sewage to come to the surface. Sandy, highly permeable soils may allow sewage to enter groundwater or lakes and streams before it is sufficiently purified.

- **Placement to Wells**



If WELLS are to be used for water supply, fresh groundwater may be in short supply in many coastal areas. Pumping water out of the ground sometimes causes salt water to contaminate wells. This potential problem should be studied thoroughly prior to development of a coastal site.

- Economic costs of options.

Several options are available including sanitary landfills and incineration:

Sanitary landfill: In this method, the wastes are dumped and covered daily in an inert material such as soil, sand, gavel or sawdust. This sealing layer should be sufficiently deep to stop scavengers (dogs, rats, pigs) or flies from getting access to the wastes. A properly maintained sanitary landfill will reduce smells, prevent wastes from being blown away, prevent breeding by flies, prevent access by scavengers, prevent fires; keep out birds; allow the material to decompose.

Sanitary landfills cannot be used in all locations and the following conditions should be met:

- Impermeable soil e.g. clay, to reduce pollution of the groundwater;
- Drainage towards the site;
- Deep soil;
- Above maximum groundwater level;
- Freedom from flooding;
- At least 30 metres (or reasonable distance depending on the local situation) from wells, streams or boreholes.

Waste transport by boat for dumping in the deep sea

Landfills may be sited in old quarries or in areas where land reclamation is planned. Alternatively, trenches may be dug or excavated. In all cases, the above criteria should be followed. The landfills should be protected by fences and trees/shrubs, and kept clear of unsightly debris. They should be regularly inspected by management to ensure satisfactory operation. This type of disposal method is better suited to a large hotel/tourism project where access to municipal services is not available. If a large project is proposed for an area which is unsuitable for sanitary landfill, then such a constraint could stop the project.

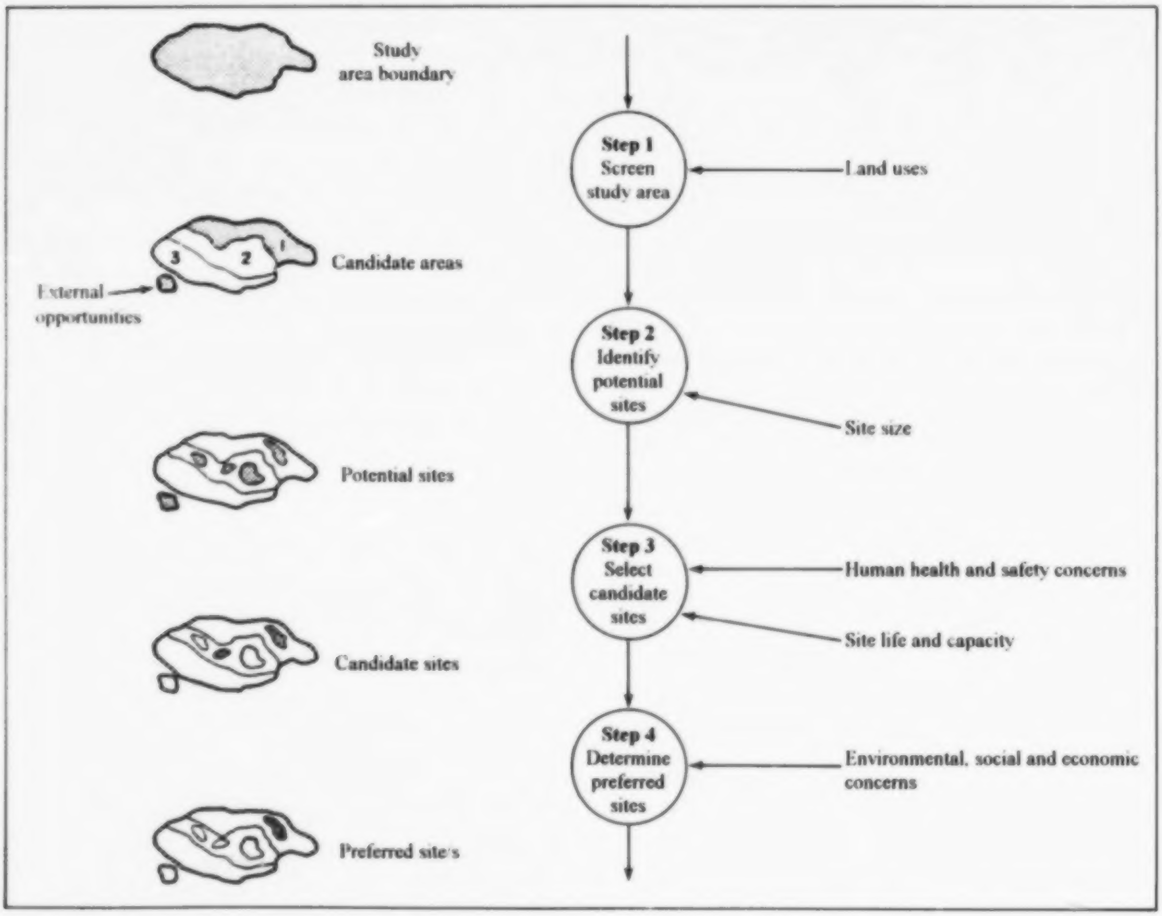
For small projects a deep pit in the soil may be possible. It should be covered so that it is water proof and not accessible to scavengers or flies, e.g. a heavy manhole lid. The pit should be above the water table, in impermeable soil (or lined), sited at least 20 metres from well, borehole or stream, and be in an area not subjected to floods.

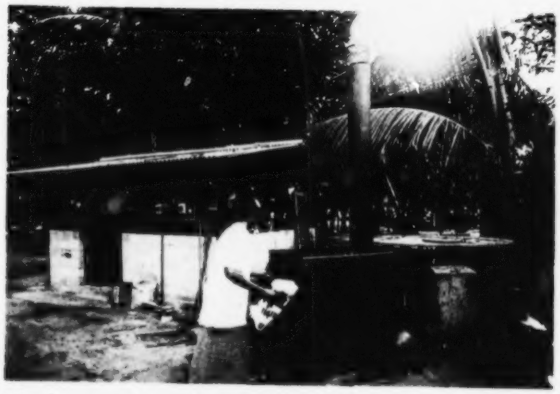
Chemicals should not be disposed of in septic tanks or other sewerage disposal systems, to avoid the risks of pollution or killing the micro-organisms that decompose sewage solids. Neither should they be poured into landfill or pit disposal systems for the same reasons. Bottles and recyclable material should be stored and returned to the manufacturer.

In coastal areas, location of sanitary landfill should be selected extremely carefully as wrong location sometimes leads to a risk of water pollution because of its fragile and porous soils. The steps needed in site selection process for the purpose have been illustrated in figure 5.4..

Incineration: It is a method of controlled burning in incinerators and is particularly useful in situations where land is scarce such as on small islands. Maldives uses this method of disposal on resort islands. This is an expensive method but it has to be adopted for areas where landfill or pit disposal systems are unsuitable due to non-availability of site risk of pollution.

Figure 5.4 Landfill site selection process


Study area boundary
Step 1 Screen study area
Land uses
3
2
1
Candidate areas
External opportunities
Step 2 Identify potential sites
Site size
Potential sites
Step 3 Select candidate sites
Human health and safety concerns
Site life and capacity
Candidate sites
Step 4 Determine preferred sites
Environmental, social and economic concerns
Preferred site/s



Island resorts frequently use incinerators for waste disposal

D. Technical guidelines on Air/Noise pollution

Air and noise pollution seem to be a less severe impact for coastal tourism in ESCAP region. The main sources of air and noise pollution, in the coastal tourist resorts are cars and other vehicles. Many case study countries have already set up ambient air and noise standards to be used as general pollution control measure. Indonesia for instance, has emission standards for stationary sources although these will soon be subjected to a complete review and revision. The present emission standards are listed in terms of pollutant concentration and are general in nature covering 19 parameters (acid gas; ammonia; antimony; arsenic; cadmium; carbon monoxide; chlorine; fluoride; hydrofluoride acid or inorganic fluoride acid; hydrogen chloride; hydrogen sulphate; lead; mercury; methyl mercaptan; nitrogen oxide; particulate matter; sulphate acid or sulphur trioxide or both; and zinc). It is anticipated that the revised emission standards will be based on 'sector' approach utilizing a technology-based derived limit, i.e., kg pollutant/product output or raw material input.[8]

In Thailand and Malaysia, motor vehicle noise emission standards and air quality standards are also being proclaimed (See annex V and VI).

E. Guidelines on siting of buildings, structures and associated facilities

Coastal tourism development involves development of buildings, structures and associated facilities, — jetties, piers, etc. on the coast line and adjacent hinterland. Such physical developments need to be regulated, controlled and carried out with great care, otherwise, serious impacts on coastal environment will be incurred. Some guidelines on these are as follows.

(1) Land development

Coastline have great natural beauty but they are also dynamic and fragile areas. Any physical development, be it building, infrastructure or supporting facility, should therefore be carefully sited to avoid adverse impacts. For instance, buildings, parking lots, storage areas should be located inland, with aesthetics in mind, so that coastal and tidal waters should not be interrupted or otherwise altered. Illustrative guidelines have been provided in figure 5.5 (a) (b).

(2) Coastal protection structures

Protection structures are constructed commonly to safeguard coastal infrastructure in the event of a storm surge or to remedy the erosion that results from unfavorable rates of longshore drift. All structures used have some degree of contact with shoreline processes, and may therefore lead to undesirable changes to the coastal system.[9] Sea walls, for example are used to protect the shore from erosion and prevent inland flooding of beach, cliff and estuarine coastlines. These are usually vertical or near-vertical impermeable structures made form concrete, wood or steel. However, when a low angle, unconsolidated dune face is replaced by a steep, impermeable wall, the shoreline equilibrium will be disrupted.

Prior to construction of wall, the increased erosional capacity of a storm surge on a shoreline is usually accompanied by a transfer of material from the dune to the beach, flattening the beach profile and dissipating wave energy. In the absence of a dune system, waves scour away beach material at the foot of the wall or other similar structure, steepening the beach, and even exposing boulders. Therefore, sea walls, through their alteration of natural processes, can lead to the substitution of a sandy shore ecosystem by a rockier shore receiving a higher energy input and hosting a different range of organisms. Scoured beach material may be carried into offshore submarine canyons resulting in a great loss to the active beach system. Sea walls can also be salf-destructive as the scouring action of wave can undermine the structure and lead to its collapse (See figure 5.6).

The effect of the wall structure is largely dependent on its location on the beach profile. Siting the wall as far inland as possible will minimize its contact with water and therefore its modification of marine processes. Low angle, rough surfaced, permeable structures

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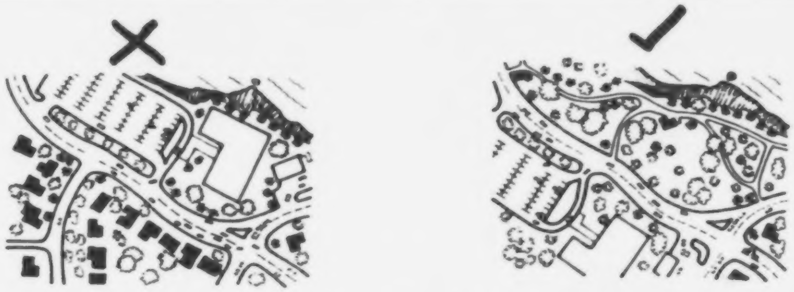
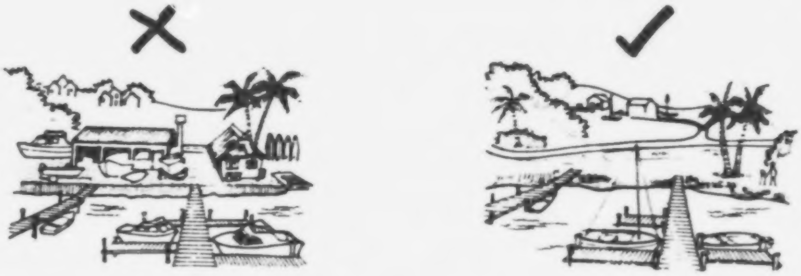
[8] Susan M. Woods, Harry Harsono, and Michael Bordt, "Environmental Management in Indonesia: Challenge and Response," 1992.

[9] UNEP, "Environmental Guidelines for Coastal Protection Measures," No. 17, 1988, pp. 3-6.

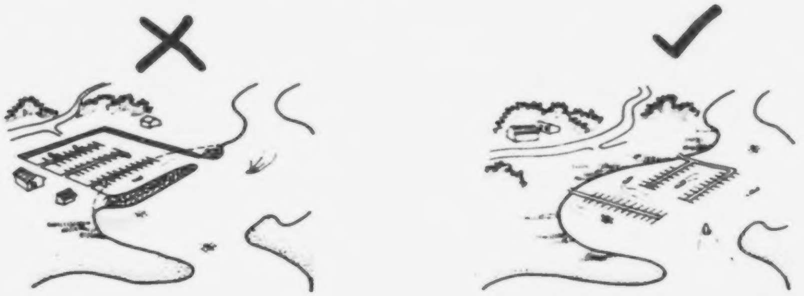
Figure 5.5 (a) Illustrative guidelines as building and structure siting



Buildings and other types of development that do not require a COASTAL LOCATION should be inland of the coastline. Locating such development inland will keep coastal areas free for more appropriate water-related uses.

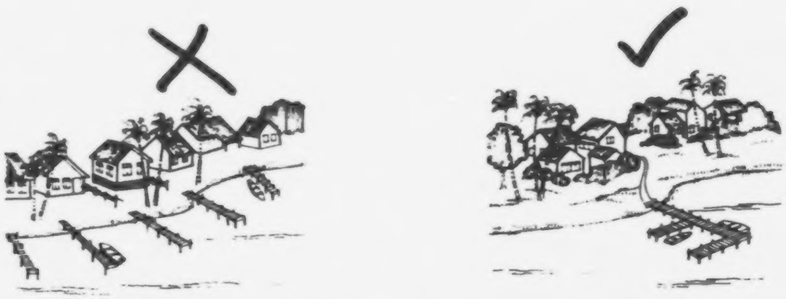


SUPPORTING FACILITIES for marinas, including buildings and storage areas, should be located inland. Locating these facilities on the shoreline occupies valuable open space, pollutes surrounding waters with storm runoff, and greatly increases the probability of serious storm damage.



MARINAS should be located in areas with steep banks and good water circulation, that provide wave and storm protection. In many cases, the natural shoreline can be largely preserved by placing boat slips farther out into the water and connecting them to the shore with wharves. This will reduce expensive dredging and bulkheading, and will preserve the shoreline for recreation and wildlife.

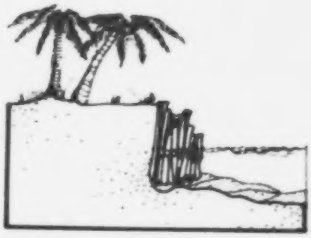
- **Proper Development of Lakefront/Coastline**

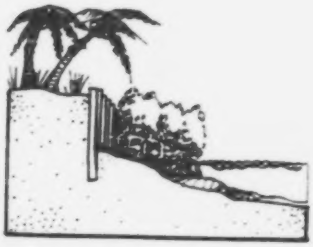


The natural quality and attractiveness of a lakefront or coastline can be destroyed by improper development. Heavy development of the immediate waterfront causes loss to most vegetation and increases danger of pollution from septic systems. Houses should be set back and clustered, with common docks and access points instead of unsightly piers.

Figure 5.5 (b)

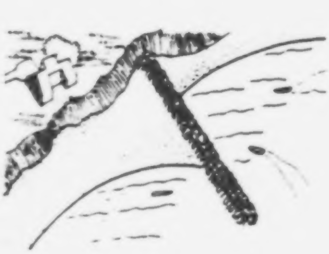
- **Avoid Bulkheading**

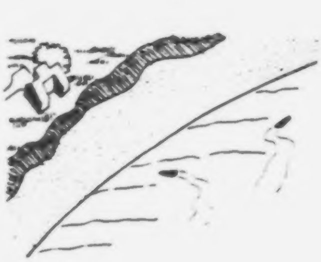




With careful planning, BULKHEADING can usually be avoided by locating development a way from eroding shorelines. If not, it may be possible to retain or establish a buffer strip of vegetation between the bulkhead and the water. This will help prevent undermining of the bulkhead and will protect wildlife habitat and increase productivity.

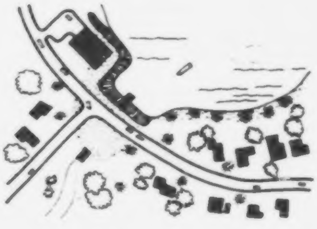
- **Eroding Beaches**

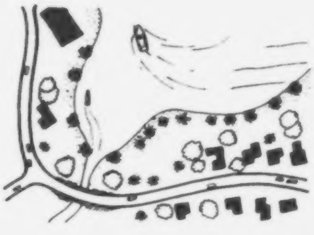




JETTIES, GROINS AND OTHER STRUCTURES perpendicular to the shoreline often cut off the transport of sand by wave action. Sand may build up on one side of the barrier while the beach on the other side is starved of sand and erodes away. Avoiding such structures allows natural processes to resupply eroding beaches with sand.

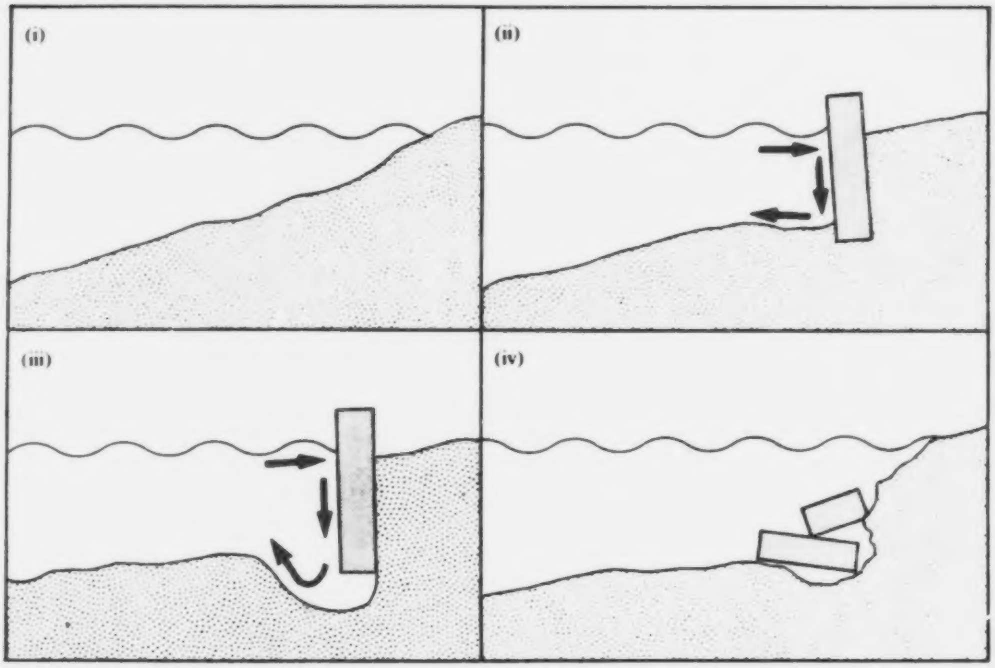
- **Reclamation of Coastal and Tidal Waters**





As a rule, coastal and tidal waters should not be filled or otherwise altered. Filled tidal areas are often subject to flooding and may result in erosion problems. In addition, filling alters the flow of water and sediments and destroys wildlife habitat and productive shallow areas.

Figure 5.6 Process of undermining of a sea wall by wave sources



The undermining of a sea wall by wave scour

are known to cause less interference with natural processes. They should always be used in preference to steep, impermeable structures, although if no additional sand is added, beach loss will occur even in this case eventually.

F. Guidelines on marine resource conservation

Besides beaches, off-shore marine water is also utilized for tourism purposes very extensively. Compared with land, the control and regulations on utilization of marine territory, especially coral reefs, are very weak. In consequence widespread damages and deterioration in environmental conditions have been reported. It is imperative, therefore, that marine resource in countries of the region should be delineated and designated for uses compatible with their sustainability. The Great Barrier Reef of Australia for example, has been divided into 7 zones — general Use A and B, Marine National Park A, B and buffer, Scientific and Preservation and Periodic Restriction zones. Each zone has its function and permissible and prohibited uses. (table 5.3). Similar approach can be used to protect marine and effective resources coastal zones of other countries the region with heavy tourist traffic.

(i) National parks: guidelines on selection, designing and management

Sustainable development requires part of the coastal area to be set aside as protected areas. Such areas, which include National Parks, make important contributions to human society by conserving the natural and cultural heritage for the enjoyment of people and ensuring ecological balance. The upkeep of protected areas does, however, represent a substantial outlay, especially for developing countries. Tourism activity in a National Park or any other protected area therefore can be used to serve as a self-financing mechanism and to promote eco-tourism as a tool of conservation. This will only be possible, however, if the level, type and management of tourism are appropriate and, in particular, the "carrying capacity" of the area is respected. Two checklists have been provided in this document (table 5.4 and 5.5) to indicate tourism potential of National Parks and potential environmental effects that need to be avoided.

In preparation of site specific plans for national parks particularly those open to tourists in coastal and marine areas it is important that human activities and man made structures should interfere as little as possible with the natural ecosystem. Bad siting

Table 5.3 Great barrier reef marine park use zones

Zones	Function	Permissable uses	Prohibited uses	Examples
General Use 'A'	Buffer	Most activities, some require permits	Commercial spearfishing, spearfishing with SCUBA	Between non-park area and more restrictive zones
General Use 'B'	Buffer	As above	As above, plus trawling and commercial shipping	As above, but where bottom disturbance is unacceptable
Marine National Park 'A'	Recreational	Non-commercial light fishing	All other fishing and collecting	Reefs requiring nearly total protection
Marine National Park 'B'	Recreational	Non-consumptive, non disruptive activities only	All consumptive activities	Areas open to public strictly for observing undisturbed natural systems
Marine National Park Buffer	Buffer	Trolling for deep water fishes	All over consumptive activities	Around otherwise completely protected reefs
Scientific and preservation	Research and special protection	Research and monitoring	All non-research or monitoring activities	Areas closed to public and exclusively available for research
Periodic restriction	Closure or restriction for special purposes	As designated	As designated	Seasonal closures, replenishment areas, special tourist areas, temporary research projects

Table 5.4 Check list on tourism potential of protected areas

Is the protected area:

- Close to an international airport or major tourist centre?
- Moderately close?
- Remote?

Is the journey to the area:

- Easy and comfortable?
- A bit of an effort?
- Arduous or dangerous?

Does the area offer the following:

- 'Star' species attractions?
- Other interesting wildlife?
- Representative wildlife?
- Distinctive wildlife viewing, e.g. on foot, by boat, from hides?

Is successful wildlife viewing:

- Guaranteed?
- Usual?
- With luck or highly seasonal?

Does the area offer:

- Several distinct features of interest?
- More than one feature of interest?
- One main feature of interest?

What standards of food and accommodation are offered?

- High standards;
- Adequate standards;
- Rough standards.

Does the area have additional:

- High cultural interest?
- Some cultural attractions?
- Few cultural attractions?

Is the area:

- Unique in its appeals?
- A little bit different?
- Similar to other visitor reserves?

Does the area have:

- A beach or lakeside recreation facilities?
- River, falls or swimming pools?
- No other recreation?

Is the area close enough to other sites of tourist interest to be part of a tourist circuit?

- Yes, other attractive sites
- Moderate potential
- Low or no such potential

Is the surrounding area:

- Of high scenic beauty or intrinsic interest?
- Quite attractive?
- Rather ordinary?

Source: MacKinnon *et al.*, 1987.

El Nido Marine Park, Philippines

may result in frightening of wildlife as well as damage to fragile ecosystem. Therefore, it is important to balance the relationships between park and its surroundings, on the one hand and the use zones and the facilities to be provided for eco-tourism in the national park on the other (box 5.1). It is also important to eliminate superfluous elements; where feasible. Other criteria in designing national parks should include:

- Designs for people. Recognize the optimal sociological use-limits of the site, as well as safety and convenience factors.
- Design within the constraints of the available resource. Recognize the optimal environmental capacity of the site and potential impacts. Use the facility as a positive control in directing use; allow only day-use facilities in some areas.
- Satisfy both form and function. Balance economic, human, and resource values.
- Provide facilities suited to the function of the place, the scale of the place, and the needs of the users.
- Recognize technical requirements (size, quantity, standards, orientation to weather and sun, convenience of access, utility costs).
- Ensure efficient and safe operating use.
- Investigate the long term implications of providing facilities, such as changing demands and technology, and continuing maintenance.
- Discourage undesirable uses.

Table 5.5 Potential environmental effects of tourism in protected areas: the types of negative visitor impacts that must be controlled

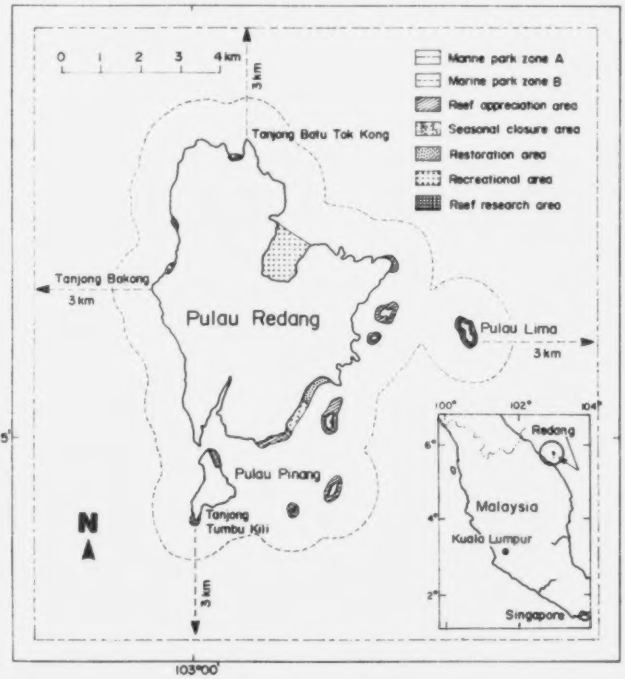
Factor involved	Impact on natural quality	Comment
Overcrowding	Environmental stress, animals show changes in behaviour	Irritation, reduction in quality, need for carrying-capacity limits or better regulation
Overdevelopment	Development of rural slums, excessive manmade structures	Unsightly urban-like development
Recreation:		
Powerboats	Disturbance of wildlife	Vulnerability during nesting seasons, noise pollution
Fishing	None	Competition with natural predators
Foot safaris	Disturbance of wildlife	Overuse and trail erosion
Pollution:		
Noise (radios, etc.)	Disturbance of natural sounds	Irritation to wildlife and other visitors
Litter	Impairment of natural scene, habituation of wildlife to garbage	Aesthetic and health hazard
Vandalism destruction	Mutilation and facility damage	Removal of natural features
Feeding of wildlife	Behavioural changes danger to tourists	Removal of habituated animals
Vehicles:		
Speeding	Wildlife mortality	Ecological changes, dust
Off-road driving	Soil and vegetation damage	Disturbance to wildlife
Miscellaneous:		
Souvenir collection	Removal of natural attractions, disruptions of natural processes	Shells, coral, horns, trophies, rare plants
Firewood	Small wildlife mortality habitat destruction	Interference with natural energy flow
Roads and excavations	Habitat loss, drainage	Aesthetic scars
Power lines	Destruction of vegetation	Aesthetic impacts
Artificial water holes and salt provision	Unnatural wildlife concentrations, vegetation damage	Replacement of soil required
Introduction of exotic plants and animals	Competition with wild species	Public confusion

Box 5.1 Zoning as a tool for promoting eco-tourism in national parks/reserves in Malaysia

Malaysia is well endowed with beach and island resorts both within Peninsular Malaysia and in Sabah and Sarawak. With a coastline of 4,800 km and over 200 large and small islands dotted along the waters of the country, these resources offer unique opportunities for recreation and fun. While the beaches are generally the focus of holiday makers, the island resorts offer yet untapped opportunities for nature tourism. The marine resources of some of the islands of Malaysia are comparable to the best in the world, utilized very careful for their tourism potential. In 1985 several islands were gazetted as protected zones for the establishment of marine parks under the Fisheries Act 1985. Among them were Pulau Redang, Pulau Tioman, Pulau Perhentian, Pulau Paya and Pulau Tinggi. The Tunku Abdul Rahman National Park in Sabah was gazetted in 1974.

These parks/reserves contain unique but finite resources for eco-tourism which provide a source of enjoyment within reason but can be destroyed by misuse and overdevelopment. Proper management of these parks/reserves was therefore considered essential to minimize the impacts due to tourism activities and at the some time to achieve ecological and resource conservation. Zoning was identified and utilized as a pertinent methodology to promote sustainable management in some of these parks/reserves in Malaysia.

A good example of a zoning is Pulau Redang Marine Park. Pulau Redang Archipelago lies off the east coast of Malaysia in the South China Sea. It has one large island about 6 km long, which is bordered by seven smaller islands on the south-east shore. The islands are fringed by coral reefs of variable qualities. Owing to the increase in the tourism industry in the islands, it became necessary to protect the marine ecology from negative tourism impacts. Zoning was introduced in the park to regulate the recreational and other associated tourism activities to avoid degradation of environment and to promote visitors enjoyment and education in the area. The accompanying figure shows the zoning plan introduced for that purpose.



Pulau Redang Marine Park

Activities guide

	Marine park zone A	Marine park zone B	Reef appreciation area	Seasonal closure area	Restoration area	Recreational area	Reef research area
Scuba diving	▨	▨	▨	░	░	▨	■
Snorkelling	▨	▨	▨	░	░	▨	■
Boating, water-skiing	▨	▨	░	░	░	⊠	░
Windsurfing	▨	▨	░	░	░	⊠	░
Passenger transporting, pleasure cruising (<50t)	▨	░	░	░	░	░	░
Hook and line fishing	▨	■	░	⊠	░	░	░
Trolling for pelagic species	░	░	░	░	░	░	░
Spearfishing	░	░	░	░	░	░	░
Trawling	░	░	░	░	░	░	░
Collecting of fish, corals, shells	░	░	░	░	░	░	░

Key: ▨ Yes ░ No ⊠ Permitted where/when stated ■ Permit required

Notes:
Pulau - island
Tanjong - cape

The boundaries and names shown on this map do not imply official endorsement or acceptance by the United Nations.

Source: Marine Parks and Reserve-Management for Coastal Environments in Southeast Asia, White, A.T. (1988), ASEAN/United States Coastal Resources Management Project Education Series 2, Philippines.

Figure. Zonation plan of Pulau Redang Marine Park, Pulau Au Redang, Malaysia

This zoned management scheme by providing a gradation of restriction where different forms of management and use can be practised has enabled the park managers to minimize the environmental impacts on the one hand and to promote eco-tourism on a sustainable basis on the other.

VI. MANAGING SOCIAL/CULTURAL IMPACT

Although social/cultural impacts from coastal tourism development have been widely recognized in a great number of cases, it is relatively, difficult to develop technical criteria, for evaluating these impacts in quantitative terms. This chapter elaborating on tourist-resident relationships emphasizes on monitoring methodology for assessing this relationship and recommends preventive measures, that can be undertaken to avoid any deterioration in this relationship leading to decline in tourism or conversely undue harmful social impacts on the local environment.

A. Socio-cultural impacts

Tourists affect the people of the host communities as a result of their direct and indirect associations with them. The social and cultural impacts of coastal tourism are reflected in the ways in which tourism is contributing to changes in value systems, individual behavior, family relationships, collective lifestyles, moral conduct, creative expressions, traditional ceremonies, and community organization.

The socio-cultural effects of tourism in coastal areas of Asia-Pacific are difficult to measure largely because these are indirect and not well-known due to lack of studies. Broadly speaking they can be classified into five components (table 6.1):

Table 6.1 Classification of social and cultural impacts of tourism: some examples

Categories	Impact components	Examples
Social	1. Demographic	Size of population, age/sex composition, growth/decline of population.
	2. Occpational	Change of occupation, professionalization, age and sex distribution of certain occupations.
	3. Transformation of norms	Values, sexual role, morals (crime, prostitution).
	4. Modification of consumption pattern	Education, infrastructure, commodities, food.
Cultural	5. Cultural	Change in tradition, religion, language.

Source: Adopted from Abraham Pizam, and other (1984), "The Social impacts of tourism", UNEP Industry and Environment, vol. 7, No. 1 (January-March 1984).

(i) Demographic impacts

A pertinent impact of tourism investment is on the migration and immigration of labour force. Immigration of workers is a common phenomenon in coastal toourism resorts (Immigration of Sri Lankan workers in resort islands of Maldives is a good example of the case).

Revival of mangroves for tourism attraction in Philippines

(ii) Occupational impacts

In economic terms, tourism takes the form of consumption of goods and services and, accordingly, provides a direct and indirect impact on employment and entrepreneurial opportunities. The World Tourism Organization (WTO) indicates that in countries with a firmly established tourism industry, the accommodation sector provides 2 to 5 per cent of the country's overall employment.

Creation of employment through tourism can have positive impacts of social preservation such as (i) avoiding the disintegration of local small communities, whose youth had to emigrate traditionally to look for jobs elsewhere; and (ii) strengthening of the indigenous identity and pride in heritage, and boosting of local income through the demand created by tourism for local arts and crafts as in Bali, Indonesia.

Tourism also has an impact on work patterns. It is recognized that the coastal tourism industry is often characterized by long hours, split shifts, and seasonality. As a result the local population has a constant turnover, which allows little time for lasting relationships; and social norms and values cannot be developed to stabilize the society. Development of tourism projects may also cause the decline of the community's traditional occupations, such as boat building and farming, resulting in the shift to new tourism-related occupations such as waiter or waitress, tourist guide, auto operators etc. In some instances, farmers abandon their fields and start renting rooms to tourists.

SSAGE PARLOUR

Tourism areas bring activities detrimental to local culture

Cultural tourism can be promoted without adverse impacts

The majority of the jobs in the tourism industry are filled by women, which has resulted in a change of the traditional role of women in countries such as Thailand towards relatively new economic and social roles.

(iii) Transformation of norms

Tourism in general has been portrayed conventionally as an agent of change of social norms and moral values. The encounter between tourists and host population causes social change, especially in isolated societies. The impact can be at the community level (crime, prostitution) as well as at the individual and family level through the erosion of traditional norms.

(iv) Modifications of consumption patterns

Tourism developments have had both positive and negative effects on the welfare and consumption patterns of the host population. It increase income and employment in the host communities with the implementation of infrastructure projects such as roads, bridges, airports, railway stations for supporting tourism. It also increases their standard of living and enhances their opportunities for shopping and recreation. On the negative side it contributes to increase of commodity and material pricing and may also cause shortage of commodities and food supplies for the local communities.

(v) Cultural impacts

Tourism provides positive opportunities to tourists to meet and interact with the host population, who speak, think and live differently, and has allowed to break cultural barriers. In Southern Australia, for example, a case-study was carried out to determine the effect of tourism on two villages, and the results indicated that tourism had led to increased contact between the people of the two villages with different ethnicity and resulted in the breakdown of the ethnic boundaries that had remained virtually unchanged for over 1,000 years prior to the advent of tourism.

The cultural impacts of tourism however have also been detrimental to the host population in terms of:

(a) Deliberate creation of "fun-filled culture" and in some instances transforming temple ceremonies, observances, musical dances and offerings into various kinds of floor shows for foreign tourists.

(b) Adaptation of local culture to meet the tourists' mistaken expectations.

(c) Commercialization of traditional activities and cultural exploitation.

(d) Loss of traditional atmosphere, increased congestion and disturbance of religious values and services.

Tourist demand for the arts, craft and cultural mainfestations also had both positive and negative impacts:

(i) Positive impact includes revival of old or lost traditions and crafts, and the creation of souvenirs, arts, and crafts for the expanded markets.

(ii) The negative impact can be seen in the craftsmen making changes in the design of their traditional products to bring them more in line with the taste of the tourists.

Tables 6.2 and 6.3 present additional listings of socio-cultural benefits and costs which may affect a tourist destination in coastal area.

Table 6.2 Social and cultural benefits which may affect a tourist destination

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(A) *Cultural development and exchange*
Increased knowledge of host culture by visitors. Awareness of its music, cuisine and arts, and possibly knowledge of language.

(B) *Social change and choice*
Increased social and job chance, increased social contacts, new ways of life, increased interest and variety, increased goods and activities choice, increased chances for women; possible independence for biological households, increased job generation gives social option to migration, production of an open society, changes and improvements in diet.

(C) *Image*
Improved reputation and visibility of host community to outsiders. Increased knowledge elsewhere about the destination.

(D) *Host culture*
Develops because of demand for traditional entertainment, demand for traditional art, architecture, crafts and music. Good local gastronomy boosted; appreciation of one's own and other socio-cultural elements.

(E) *Health*
Improved public health, hygiene and sanitation standards. Improved health services, sewage and waste treatment. Environmental services upgraded.

(F) *Social and amenity improvement*
By provision of services amenities and facilities not otherwise available to host – and social and activity choices therefore arising from them.

(G) *Education and conservation*
Education and learning aided. Training opportunities developed. Boosts for heritage protection, interpretation and management.

(H) *Understanding*
Cultural interchange of hosts and guests, peace and understanding aided; breakdown of language barriers, of social and class barriers, of religious barriers, and of racial barriers. New experiences possible, access to new ideas, lifestyles and cultures.

(I) *Political changes*
Repressive political systems may be modified as a result of large-scale movements of people, goods and ideas to tourist destinations. The young, the radical, and forces for change may be aided by tourism.

Source: Anthony S., Travis (1984), "Social and cultural aspects of tourism", *UNEP Industry and Environment*, vol. 7, No. 1 (January-March 1984).

B. Tourist-resident relationships

Unless deliberately planned (box 6.1) interaction between tourists and local residents is unavoidable. Sometimes, it results in unacceptable change of social values or culture of the locality or tourist destination. A typical problem is to define what is meant by "unacceptable change". Levels of social and cultural changes acceptable to a government for example, may not be acceptable at all to the local residents or communities. In such cases wish of the government to reap material benefits of tourism would be in direct conflict with the desire of the local population. Conversely, local residents may want to integrate their lifestyle with the demands of tourism, whereas the government may wish to protect them from influences which it may deem unacceptable such as increased exposure to alcohol, disparate lifestyles, and attitudes divorced from the prevailing norm. In most cases, however, efforts of both governments and host population converge on avoiding the adverse social impacts of tourism.

The social and cultural impacts of tourism depend on the size and type of tourists as well as the absorption capacity of native population. Accordingly, the social/cultural carrying capacity of tourism will not only very from country to country but also from place to place within the same country.

Balinese dance: a cultural tourism asset

A theoretical model on carrying capacity of tourist-resident relationship has been depicted in figure 6.1. It shows certain stages of reactions of tourists and residents to each other. The model demonstrates that adverse or negative interaction can be usually observed or detected before the situation develops beyond the critical limit. The feeling and attitude of local residents towards visitors are usually positive in the initial phase when the tourism starts to develop. As times pass by and commercialization of tourism grows, signs of wariness or resentment of foreign tourist may appear in the attitude of local residents.

Table 6.3 Social and cultural costs which may affect a tourist destination

---

(A) *Cultural impacts*
Host culture destruction, host culture debasement.
- Unacceptable rate and scale of cultural conflict and change
- Damage to cultural systems and to cultural resources
  Minority languages at destinations placed at risk.
  Changes in sexual habits and roles.
- Demonstration Effect: residents copy behaviour, values, norms of visitors.

(B) *Social stability*
- Loss of original state and stability. Loss of cultural pride. Status relationship between host and guest cultures changes.
- Changes in community cohesion, disruption of kinship and community ties.
- Groups likely to gain from change in conflict with existing old, conservative order. Simplicity gives way to complexity.

(C) *Consumerism*
- Consumption changes. Introduction or expansion of gambling, prostitution, drunkenness and other excesses; vice and drugs, theft and petty crimes grow.
- Rich visitors come to poor communities – creating tension, increased differences between haves/have-nots; envy, dislike, hatred.
- Cultural commercialization and commodification of society.
- Commercialization of the arts: folk art becomes airport junk-art.
- Deeper values and ideals at risk.
- Increased role and ascendance of commercial interests.
- Increased living costs, growth of money-economy and of materialism and consumerism.

(D) *Law and order*
Increase of social conflicts, development of irritations, antagonisms and interest groups; increase in crime, social tensions, dangers. More policing, more control necessary. Growth of prostitution, gambling, with or without licensing – socio-economic conflicts and attacks.

(E) *Social links and choice*
Short-term and transient social relationships with visitors are not real and meaningful links.
- No visitor understanding or knowledge of hosts, their culture and language.
- Misunderstanding. Hostility, debasement. Destruction of social spontaneity. Costlier living, diminished housing chances, lead to more overcrowding, social tension in families.

(F) *Health*
New diseases introduced, plus more of old diseases.

(G) *Meanings*
Increasingly mass entry of visitors, makes contact and meaning diminish. Commercialization of religion and rituals, decline of traditional religion. Pressure to change social values, dress, mores, habits and behavioural norms.

(H) *Political*
Tourism and neo-colonialism; political conflict encouraged destabilization. Migrant workers introduced – increased political and economic conflicts – social implications.

Source: Anthony S., Travis (1984), "Social and cultural aspects of tourism", *UNEP Industry and Environment*, vol. 7, No. 1 (January-March 1984).

Such feelings are due to varied factors, but usually result from resentment or apprehension about the changes that tourism may bring to the local way of life. Primarily these involve social/cultural characteristics which emanate from the increased tourist traffic in a country particularly one with smaller size. In a large country such as Indonesia with a population of 175 million for example, an annual flow of about 2.6 million tourists per year may not have any serious fear of socio-cultural impacts. However a small country such as Maldives, with a population of 220,000 may probably consider a million visitors annually an unacceptably high number for tourism for fear over the social consequences of such an influx. Even in Indonesia if most of 2.6 million tourist visiting the country converge in a specific resort island having only a few hundred thousand local population, social/cultural condition of that resort island may also be thought to be threatened.

Development of perceived social threats from tourism can result in the expression of negative attitude of local residents towards tourists which can be seriously deterimental to tourism. The development of such deteriorating relationships between the tourists and the local residents therefore needs to be monitored and corrected before it becomes too late.

C. Monitoring and Mitigation

A regular check or monitoring, say once or twice a year, may therefore be necessary in order to know which direction — positive or negative — the changes in local community are heading to.

(i) *Monitoring methodologies*

Numerous social science methodologies are available for monitoring of positive and negative impacts

Box 6.1 Tourism development with minimal social impacts: the case of Maldives

The Republic of Maldives until 1970s had an isolated subsistence economy where fishing, shipping and export of coconut products were the main sources of earning. The introduction and growth of tourism had a major impact on the economy and development of the country. The industry was based on only one resort and about a thousand tourists in 1972. The number of tourists increased to 40,000 by 1980 and 196,000 by 1991 (almost equal to the number of local, inhabitants). Today the country is ranked as one of the world's most tourism oriented economies with revenues from this source accounting for three fifths of visible export receipts and about 18 per cent of GDP.

During the course of this phenomenal growth in tourism. The policy of government remained limited to developing uninhabited islands. This policy has been the key factor in avoiding the cultural conflicts and promoting socially sustainable development of tourism in the country through keeping minimal contacts between tourists and indigenous population.

Until June 1992, tourist resorts had been developed on only 67 of the 1,200 islands in Maldives. The size of resorts vary greatly accommodating from about 12 to 400 beds. Although all resorts are endowed with the beauty of white sandy beaches, unpolluted and clear waters and quite hospitable setting, most of these are distinct in terms of facilities and services offered. For example, some of these are more popular as diving resorts while others offer attraction in terms of water sports, still others have charm of relaxation and natural beauty enjoyment.

Maldives: avoiding cultural conflicts by designating tourist islands

The dispersed island situation and small size of resort islands (only a few exceeding 2 square kilometre in area) has put unavoidable constraints to physical developments. As a result most resort islands are forced to have their own supply of electricity (generators), fresh water (desalination plants) and solid waste disposal facilities (incinerators). Further almost all food requirements for daily need of resorts have to be imported, in addition to the building material and labour. However the situation has been used by Maldivians as an asset rather than constraint through promotion of quality tourism with minimal adverse impact on natural and cultural environment.

The case of Maldives besides carrying other lessons provides a loud and clear message that promotion of quality tourism is a much better option compared to mass or quantity tourism. Ultimately it is the key to sustained development of coastal tourism in term of economic, social as well as ecological trade offs.

of coastal tourism. These include group interviews, random surveys and administration of questionnaires (table 6.4).

If the surveyed results contain more positive changes (benefits) than negative (costs), the coastal tourism development is heading in a satisfactory direction. If vice versa, the component of adversely affected social values have to be identified and mitigation measures have to be subsequently undertaken urgently through regulatory approach involving planning, institutional and legislative measures as well as awareness raising.

Figure 6.1 Tourist-resident relationships: A theoretical model

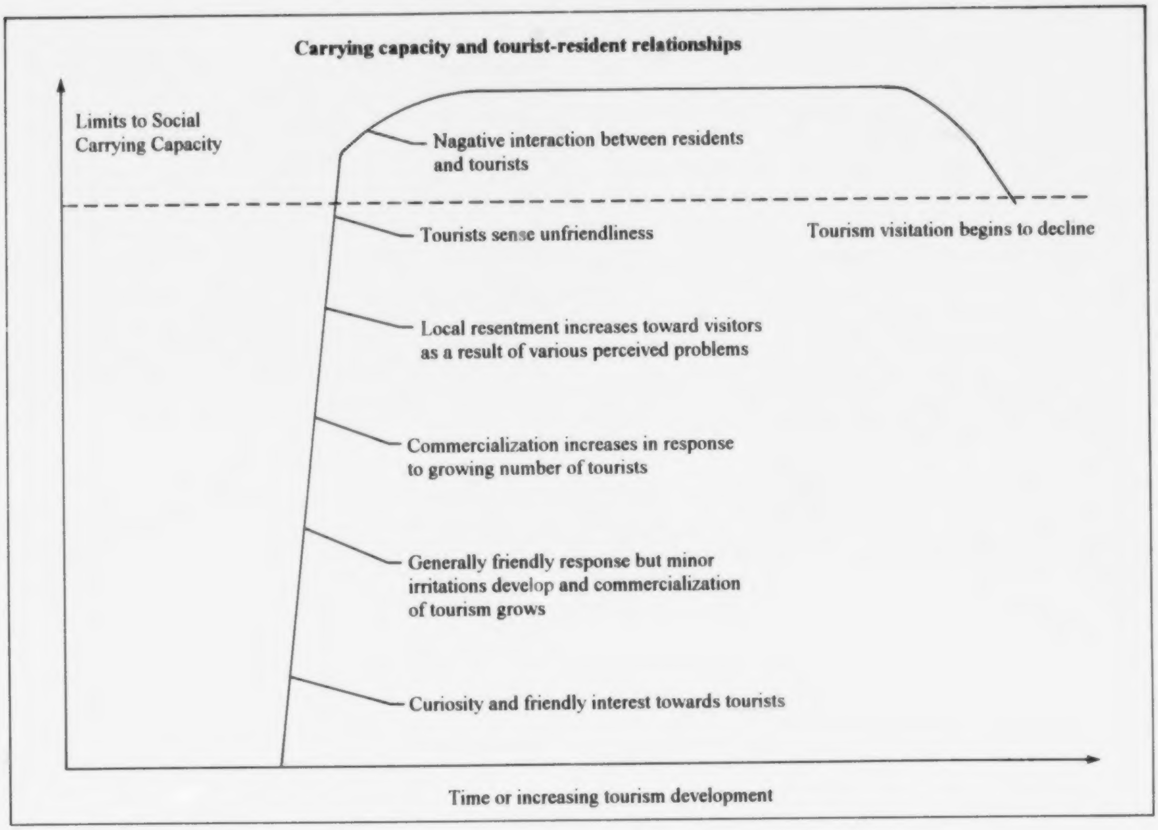
Carrying capacity and tourist-resident relationships
Limits to Social Carrying Capacity
Nagative interaction between residents and tourists
Tourists sense unfriendliness
Tourism visitation begins to decline
Local resentment increases toward visitors as a result of various perceived problems
Commercialization increases in response to growing number of tourists
Generally friendly response but minor irritations develop and commercialization of tourism grows
Curiosity and friendly interest towards tourists
Time or increasing tourism development

Table 6.4 A sample questionnaire for social impacts monitoring

(i)	As a result of the tourism related developments or tourist activities, have any cultural sites in the area been damaged: If Yes, give details.	Yes	No
(ii)	Has local employment increased:	Yes	No
(iii)	Has local economy improved by the tourism related developments: If not, explain why not.	Yes	No
(iv)	Have traditional cultural values been affected by the tourism related developments: If Yes, explain in what way	Yes	No
(v)	Do you like having the tourism related developments in your area: If No, explain why not. If Yes, say why.	Yes	No
(vi)	Do you feel local people are sufficiently integrated into the tourism related developments: If Yes, say way.	Yes	No
(vii)	Do you think tourists are well-behaved to local residents: If No, explain why not.	Yes	No
(viii)	Has the tourism related developments disrupted or in any way interfered with the life style you would have liked to lead: If Yes, explain how.	Yes	No
(ix)	Has the tourism developments improved your life in any way: If Yes, explain how.	Yes	No
(x)	Has the tourism encouraged tourists to develop an understanding of the local way of life: If Yes, say how. If No, how could this be improved.	Yes	No
(xi)	Please make any comments you wish to about the tourism related developments and their social effects.	Yes	No

VII. POLICY RECOMMENDATIONS

World Tourism Organization (WTO), has reported that tourism, now the world third largest sector of income generation after oil and automobile industries, will continue to grow in the coming decade. Asia and Pacific will be outperforming many other regions of the world in tourism growth and development. A major underlying factor, contributing to such high tourist potentiality of the region is its coastal tourism assets. If the projections of WTO come true, it is quite certain that the coastal areas of the countries in the ESCAP region will have to shoulder a higher pressure from fast-growing coastal tourism, at least, in the coming decade, or even longer.

This potential growth calls for a more vigilant approach towards environment which is the very basis of tourism industry. Already signs of adverse impacts of tourism on environment are visible as outlined in previous chapters. If the problems is not tackled expeditiously, it may lead to extremely serious situation. In addition to existing destinations, many more new beach resorts are expected to be developed in Asia and the Pacific to cater for the increased tourist market and these will be equally vulnerable to environmental degradation similar to their predecessors.

In order to avoid such a gloomy scenario, many mitigation and preventive measures have been recommended for implementation in previous chapters of this study. Many of these recommendation, however, are primarily of problem solving nature. In addition to these an important ingredient in the preventive measures would be conducive high-level policies towards integration of environment and development in general as well as assigning of increased importance to environmental conservation in tourism related developments.

A. General policy measures on integration of environment and development

In many Asian and Pacific countries, the decision-making process separates environment and economic development aspects. Reshaping the process would require legal and administrative adjustments. To achieve a decision-making process compatible with both the environment and development goals, an efficient institutional coordination would need to be developed that could effectively incorporate multidisciplinary, intersectoral and cross-sectoral dimension of environmentally sound and sustainable development. To ensure that all environment and development aims are achieved, a systematic monitoring, evaluation and reporting process would also need to be established. Under this process, regular reviews to the state of the environment, the stock taking of natural resources, use and availability of efficient and appropriate technology and the level of public awareness would need to be gauged to assess the progress in the implementation of sustainable development policies.

Emphasis would need to be placed on environmental accounting to assess the current and future values of natural resources. Standardized criteria/indicators would need to be identified to ensure the improvement in quality of life. Regional cooperation in the exchange of information, experiences, expertise and technologies would also need to be promoted in learning from each other.

B. Tourism and environment related policies

While inter-sectoral and multi-disciplinary approaches are necessary for overall policy framework on

Derelictt tin mines of Phuket being converted to golf courses: a blessing or a peril?

Golf tourism has serious impacts on the environment in Asia-Pacific sustainable development. It is also important to take effective policy measures for integrating environmental consideration within the tourism sectors. The specific policy measures for this purpose may include:

(1) Integrating environmental considerations in tourism sector

It is no longer appropriate to think of environmental protection and tourism development as conflicting or competitive. They are complementary and compatible courses of action. In the period after the United Nations Conference of Environment and Development, when countries have developed support for the principles of sustainable development, i.e. patterns of growth which husband natural resources in a way that maintains their capability to deliver future benefits; no other economic activity lends itself to this approach better than tourism.[10]

During the fast growth of tourism industry in many countries of the Asian and Pacific region in recent year some contradictions have arisen with environmental conservation. This pattern of growth is against the long term sustainable development of tourism and needs to be changed. The exploitative policies need to be replaced with those which give due weighting to environmental trade offs. The tourism development path will need to be made more circumspect with carrot and stick approaches in order to attain the long-term goal of sustainable development.

Netional planning would also need to go hand in hand with regional planning in order to develop optimal national tourism development plans. The EIA process is limited in scope to the particular project of concern and can hardly be a substitute for regional or national planning. However, in those cases where regional plans are not available, the EIA should play an extended role. It must not only examine the local effects of the project (which it can do in detail) but also, to the extent feasible, examine the project's overall impact on the region/country.

A dilemma for governments is that most commercial coastal tourism development in the ESCAP region is carried out by private enterprises, and it is difficult to convince private developers of the importance of preserving long-term environmental values. Management of tourism resources in such cases would involve identifying efficient and acceptable means of placing controls on the development. Both EIA and regional planning can assist in setting guidelines for such purposes. Local groups would also need to be encouraged to take community-level responsibility for the conservation of the coastal resources. They should also be promoted as pressure groups to be able to assist in streamlining Commercial tourism activities to conform to long-term, sustainable development goals.

Appropriate policy designs are needed to protect these tourism assets

(2) Mobilizing public-sector investment

Tourism is a kind of industry. In order to develop industrial estate, it is commonly known and accepted fact that infrastructure investments, be it road access, electricity and water supply systems, waste treatment plant, etc., have to be developed prior to, or at least along with, plants and construction associated with manufacturing.

However, as far as tourism is concerned, many decision-makers still regard it as an economic sector which does not need investment from public exchequer. Numerous tourist towns or urban communities are lift facing haphazard growth without infrastructure even thought these are publicized and widely promoted as coastal resorts. Public utilities and infrastructure development projects get budgetary allocation and implementation, usually, after the deficiency/shortage or adverse impacts become imminent. This problem solving attitude alone needs to be changed with a combination of problem solving as well as prevention approaches.

Judging from economic and financial capability of the countries, in the ESCAP region particularly the least developed and developing ones, the infrastructure provision for coastal resorts is a rather heavy investment to afford, especially if they have to be carried out for every destination simultaneously. In order to lessen the burden, goals and priorities for each specific coastal destinations have to be planned and set up at the national scale. The present system of "open all destinations" benefits only some tourism business in-

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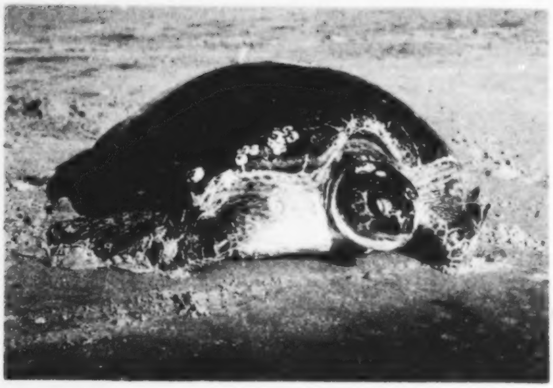
[10] Barry Sadler (1990), "Sustaining Tomorrow and Endless Summer: On Linking Tourism and Environment in the Caribbean," Workshop Papers on Environment, Tourism and Development: An Agenda for Action".

Only environmentally friendly tourism can save scenic assets



Appropriate ecotourism may contribute resources to save marine species

vestors, and opens the vulnerable coastal environment particularly their fragile ecosystems to degradation. The priority setting and changing of attitude on infrastructure investment, therefore, are needed in order to attain a sustainable coastal tourism goal.

(3) Managemental Aspects

The policies on managemental aspects in sustainable development of coastal tourism should take into account capacity building including human resource development, monitoring including development of data and information system, regulatory control, awareness creation and transfer of appropriate technology as their essential elements.

Capacity building is an essential step in promoting sustainable tourism development particularly for dealing with new long term challenges in addition to concentrating on immediate problems. Institutional capacities will have to be strengthened and expertise would need to be built at various level of governments, business, and private enterprise to understand the tradeoffs between tourism and environment. Moreover, skill, knowledge and knowhow would have to be enhanced to promote sustainable tourism development and management.

Monitoring of environmental parameters in tourist resorts would also be necessary to provide an important basis for informed decision making in tourism sector. Major efforts would therefore be needed to augment capacities on environmental monitoring and in collecting and analyzing data and information towards sustainable tourism development.

There is an increasing advocacy to rely more on market and less on government to promote sustainable development. However the government would have to continue maintaining its central regulatory role as private markets, as yet, provides little incentives for imbuing pollution. Whether it be air pollution in tourist resorts or dumping of wastes on public beaches and in coastal water or an inappropriate use of land whose ownership is unclear there is a compelling case for public action. Through provision of incentives, however, the government can also promote eco-tourism in coastal areas which while raising the income can also serve as a vehicle for environmental protection.

There is also a need to increase people's sensitivity to, and involvement in, finding solutions in promoting sustainable tourism development. Education can give people the environmental and ethical awareness, values and attitudes, skills and behaviour needed for sustainable development. To do this, policies should be adopted to make environment and development education available to people of all ages.

All sectors of society, including tourism industry, universities, governments, non-governmental organizations and community organizations should be encouraged to train people in environmental management. Further the media, theatre groups, entertainment and advertising industries, should be involved in promoting campaigns on sustainable coastal tourism development.

Environmentally sound technologies are also required to manage waste and check pollution for tourism establishments. Such technologies include not only the hardware but the know-how, services, equipment, organizational and managerial skills to make them work. The transfer of technologies policies should therefore be adopted to facilitate the use of such technologies through regional and international cooperation.

In addition to the above, a number of other recommendations for sustainable development of coastal tourism in the Asian and Pacific region were reviewed by the expert group meeting on environmental management of coastal tourism development in the context

Participation is the basic ingredient of sustainable tourism

Expert Meeting in Bali identifying activities to safeguard coastal tourism assets

of follow up of Agenda 21 of the United Nations Conference on Environment and Development and the Regional Strategy on Environmentally Sound and Sustainable Development endorsed by the Commission in its sesolutin 47/7. The Meeting proposed an action framework to follow-up Agenda 21 in the field of tourism, while the main activities proposed at the national, sub-national and local levels are given below.

(i) National and subnational activities

(a) Preparation and implementation of cross-sectoral national and regional plans on tourism development;

(b) Assessment of coastal tourism potential taking into consideration needs of international and domestic tourists for the identification of sustainable programmes for integrated coastal tourism management at appropriate levels;

(c) Preparation of coastal profiles to identify critical areas, including eroded zones, physical processes, tourism development patterns, user conflicts and specific priorities for management of resources;

(d) Improvement of coastal human settlements (attractive to tourism) especially in terms of infrastructure development including provision of drinking water, disposal of sewage, solid wastes and industrial effluent;

(e) Periodic assessment of the impacts of tourism at national and sub-national levels in line with the objectives of integrated management and sustainable development of coastal areas and marine environment;

(f) Conservation and restoration of altered critical habitats and ecosystems;

(g) Integration of sectoral programmes on sustainable development for tourism, and other sectors such as agriculture, fishing, transport, trade and industries affecting coastal areas;

(h) Development and maintenance of databases for the assessment and overall management of coastal areas and their resources for tourism;

(i) Provision to give tourism the status of an industry, similar to policies followed in the sustainable development of other industrial estates; and to adopt spatial and other policies in tourist resorts related to:

    (i) Infrastructure development;
    (ii) Environmental Impact Assessment;
    (iii) Human resource development and training;
    (iv) Public education, awareness and information programmes;
    (v) Development and implementation of environmental quality criteria.

(j) Exchange information and data on coastal tourism development. For this purpose regional cooperation should be promoted as appropriate, in the preparation of national guidelines for integrated coastal zone management and tourism development, drawing on past and existing experiences.

(k) Formulation of new laws and regulations or amendment of existing laws and regulations to promote better coordination among agencies involved in sustainable tourism development.

(ii) Local/project level actions

(a) Strengthen institutional capacities of local authorities to promote sustainable development of coastal tourism.

(b) Conduct Environmental Impact Assessment (EIA) of all major tourism-related and resort development projects and conduct monitoring and post-audits.

(c) Conduct Environmental Impact Assessment (EIA) of large scale package tours for mitigating negative impacts and identifying residual impacts, if any.

(d) Promote community participation in tourism development projects at the local level.

(e) Promote campaigns in individual tourist resorts to enhance awareness for a code of conduct leading to sustainable management of environment among tourists and local residents.

(f) Monitor regularly the social and cultural impacts of coastal tourism.

(g) Undertake local-level research on the environmental and socio-cultural impacts of coastal tourism for their mitigation and prevention.

(h) To promote human resource development of local authorities, NGOs and the private sector on sustainable development of coastal tourism at the local level.

ANNEX I

METHODOLOGY FOR STUDYING CARRYING CAPACITY OF TOURIST RESOURCES

Carrying capacity of tourist should be examined in terms of availabilities of the following:

- Area,
- Water Supply,
- Labour Market,
- Transportation, and
- Others

1. Requirements for area

(1) Basic formula

When site is given, its carrying capacity will be figured out as follows:

CPI = AR/a
CPD = CPI x TR = AR x TR/a
CPY = CPD/PR = AR x TR/(a x PR)

CPI : Instantaneous carrying capacity
CPD : Daily capacity
CPY : Yearly capacity
AR : Size of area
a : Space standard (Necessary area per person)
TR : Turnover rate of users per day
PR : (day use) Target ratio of number of daily users to that of yearly ones (overnight use) 1/(365 x OR)
OR : (Bed) occupancy rate

- The above formula could be applied to group of activities whose requirements for area and patterns of behavior resemble one another.
- When tourism demand is given, the necessary area will be figured out as follows:

AR : TD x a x PR/TR (TR: Tourism demand)

(2) Basic data

a. Space standard

Resort Hotel

a = ES/(ST x BC)

a : Space standard of hotel site
FS : Overall floor space = GS/(2 x RG)
GS : Floor space of guest room (twin beds)
RG : Ratio of floor space of guest room to overall floor space
ST : Number of stories
BC : Building coverage ratio

Space standard of hoted site (a)

(m^2/person)

			Building coverage ratio		
			0.10	0.20	0.30
High class 1		1	360–370	180–185	120–125
GS = 33m2	ST	2	180–185	90–95	60–65
RG = 0.45		3	120–125	60–65	40–45
Medium class		1	270–275	135–140	9-0–95
GS = 33m2	ST	1	135–140	65–70	45–50
RG = 0.45		3	90–95	45–50	30–35

In many cases space standards are fixed by the government for example in Indonesia minimum space standard for twin-bed room is fixed by the Directorate General of Tourism as 24 m^2/room for 3 star hotel and 26 m^2/room for 5 star hotel.

Camp Ground (not auto-camp style)

a = US/(N x RU) = 100-200 m^2/person

US : Tent site space per unit (40 m^2)
N : Number of users per unit (4 person)
RU : Ratio of tent site space of overall site space (in case of resort: 0.05-0.10)

Recreation area (in case of resort)

(m^2/person)

	Facility	Landscap	Total
Beach	15–20	15–20	30–40
Picnic	30–40	30–40	60–80
Sports	100–200	100–200	200–400

b. Turnover ratio

Turnover ratio varies with climate, location and activities, but its standard figures could be as follows:

Accommodation : 1.0
Beach : 1.0-1.15
Picnic ground : 1.2-1.8
Sports ground : 2.0-2.5

(3) Requirements for other aspects

a. Water requirements

Hotel : 500 (Medium class) — 750 (high class) litre/bed. It is desirable to consider higher standard in case of beach resort because of extra demand for shower after sea bathing.

Camp ground : 100-200 litre/bed

Day use recreation area
(picnic area) : 30-50 litre/person
(beach area) : 50-100 litre/person

b. Labour requirements

Hotel : 1.60 persons/room
Camp ground : 0.05-0.10 person/bed
Tourist object : 2-10 persons/ha
Cruising boat : 0.2-0.3 persons/pax

c. Transportation requirements

The traffic capacity of roads can be calculated as follows:

$SF_i = 2{,}800 \times (v./c)_i \times f_d \times f_w \times f_{HV}$

SF_i = Total service flow rate in both directions for prevailing roadway and traffic conditions, for level of service i, in vehicles per hour.

$(v./c_i)$ = Ratio of flow rate to ideal capacity for level of service i

f_d = Adjustment factor for directional distribution of traffic

f_w = Adjustment factor for narrow lanes and restricted shoulder width

f_{HV} = Adjustment factor for the presence of heavy vehicles in the traffic stream, computed as:

$f_{HV} = 1/[1+P_T(E_T\text{-}1) + P_R(E_R\text{-}1) + P_B(E_B\text{-}1)$

P_R = Proportion of recreation vehicles in the traffic stream

P_T = Proportion of trucks in the traffic stream

P_B = Proportion of buses in the traffic stream

E_T = Passenger-car equivalent for trucks

E_R = Passenger-car equivalent for recreation vehicles

E_B = Passenger-car equivalent for buses

If the approximate traffic capacity of two (2) lane provincial roads in the study region, in general, is estimated at 1,000 to 1,500 vehicles/hour/both directions, the instantaneous carrying capacity of tourist resources shall be determined to meet the abovementioned traffic capacity as follows.

CPI = NRV x anp x lva

NRV : Capacity of recreation vehicles (SF x Portion of recreation traffic = SF x (0.5-0.9))

anp : Average number of passengers per vehicle

lva : Effective hours for visitor arrival

Assuming that the proportion of trucks and buses will be 0.05 and 0.3-0.5 respectively, the maximum number of visitor arrivals per hour can be calculated as shown in the following table).

Maximum number of visitor arrivals per hour by two lanes provincial road

(1,000 persons)

		Proportion of recreation vehicles				
		0.5	**0.6**	**0.7**	**0.8**	**0.9**
	0.1	3.9 - 5.0	4.7 - 7.1	5.5 - 8.3	6.3 - 9.4	7.1 - 10.6
POB	0.2	6.1 - 9.2	7.3 - 11.0	8.6 - 12.8	9.8 - 14.7	11.0 - 16.5
	0.3	8.3 - 12.5	10.0 - 14.9	11.6 - 17.4	13.3 - 19.9	14.9 - 22.4

2. Case study on Pantai Carita resort Indonesia[1]

Although carrying capacity was to be examined from all kinds of aspects mentioned above, only space requirement was calculated initially and was available for this work.

- Size of site

  $3{,}000 \times 150 \times 2/3 = 300{,}000\ m^2$
  2/3: Coefficient of effective land

- Basic data to be applied

  (Accommodation)
  $GS = 27\ m^2$, $RG = 0.50$, $ST = 1, 2$, $BC = 0.15$
  $a = 27/(2 \times 0.5 \times 1.2 \times 0.15) = 150\ m^2$/person

(Day use facilities)

  $a = 60\ m^2$/person

- Assumption

  NA : ND = 40: 60 (35: 65 in present time)

  NA : Number of yearly overnight user visitors
  ND : Number of yearly day use visitors

- Formulation

  $CPIA = NA \times ls/(365 \times OR)$
  $CPID = ND \times PR \times 1/TR$

CPIA : Instantaneous carrying capacity of overnight-use
CPID : Instantaneous carrying capacity of day-use
ls : Average length of stay (1.3 nights)
PR : Target ratio of number of daily day-use visitors to that of yearly ones (0.02)
TR : Turnover rate of day-use visitors per day (1.2)
OR : Target average bed occupancy rate (0.3)
$150 \times CPIA + 60 \times CPID = 300{,}000$ m2

- Results

CPIA = 1,100 beds, CPID = 2,300 persons
Total = 3,200 persons
NA = 91,000 persons, ND = 137,000 persons
Total 228,000 persons

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[1] *Source:* Directorate General of Tourism, Government of Indonesia.

ANNEX II

SUMMARY OF A STUDY ON CARRYING CAPACITY FOR TOURISM DEVELOPMENT OF KO SAMUI

1. Objective of study

(1) To identify the physical, environmental and social carrying capacities of Ko Samui.

(2) To identify the amount of infrastructure and services appropriate to the identified levels of capacity.

(3) To provide measures for controlling the number of tourists within the limit not harmful to the attraction places.

(4) To provide guidelines for planning preventive measures against the foreseeable problems, based upon the results of the study.

The results of the study were to be used to direct the tourism development of Ko Samui and as a guideline for similar study in other attraction places.

2. The concept of the study

The concept of this study basically relied on the carrying capacity of the environment and its components using resource-oriented approaches. It covered three aspects of carry capacity as follows:

(1) Environmental carrying capacity: referring to the number of tourists or vacation activities which jeopardize the value of the environment.

(2) Physical carrying capacity: referring to the saturation of tourism facilities or physical destruction of the environment including the man-made ones.

(3) Social (Perceptual) carrying capacity: referring to the deminishing satisfaction of tourists as well as the negative perception of the local residents.

The following factors were studied.

The physical factors

- The area condition of tourism utilization (beach service area, activities, waterfall, etc).
- Landscape and scenery, trees, and buildings.
- Infrastructure and facilities, i.e. roads, electricity, water supply, accommodation and commercial shops.

The ecological factors

- Refuse collection and disposal
- Sewage
- Quality of drinking water, sea water, and the environment
- Amount and living condition of coral and wild animals

The social factors

- The attitude of tourists toward the number of tourists
- The attitude of local residents toward tourism

These factors have different carrying capacities at the individual attraction place level and at the island level under the present management. In this study, the present tourism condition as well as its existing capacity were evaluated. Appropriate level of capacity necessary for maintaining the condition was identified by two preliminary selection methods based upon the capacity of the most sensitive factor, and the minimum level of social cost. Various levels of capacity were compared and selected for the most appropriate one before the conclusion and final recommendations were made.

3. Results of the study

3.1 Tourism areas

The study identified 27 places of tourist attraction in Ko Samui, and classified these as follows: 12 of natural type, 4 of waterfall and mountain type, and 11 of cultural and religious type. Moreover, it also lists 7 interesting sites of coral reef. The maximum area identified for future tourism expansion was 11,207.84 rais, 9,137.57 rais for service area, and 2,070.27 rais for activity area (On short-term basis, the above-mentioned areas was 3,576.57 rais and 1,012.27 rais respectively.), as shown in table 1. The study selected 22 representative areas, comprising of 19 hotels and bungalows in 6 beach areas, and 3 sites from the waterfall, mountain and cultural areas. The data on various factors of each type of attraction place and of Ko Samui as a whole were collected and examined.

Table 1. Tourism area classified by territorial threshold for tourism

Attraction places	An appropriate service area (3)			An appropriate area for the activities (4)			Total
	Total	Short term	Long term	Total	Short term	Long term	
Beach Area (1)	(9,432)	(3,565)	(5,567)	(1,064)	(1,006)	(1,058)	
Hat Chaweng	1,193	703	490	495	135	360	1.68
Hat Lamai	818	818	–	117	96	21	93
Hat Thong Yang/Hat Laem Din	1,170	354	816	554	228	326	1.72
Hat Maenam	1,331	544	787	277	225	52	1.60
Hat Bo Phut	326	326	–	108	108	–	43
Hat Bang Rak	340	110	230	210	83	127	55
Hat Choeng Mon/Hat Thong Son	600	310	290	125	95	30	72
Ko Taen and near by	940	–	940	14	–	14	95
Others (2)	2,414	400	2,014	164	36	128	2.54
Na Muang Waterfall	0.26	0.26	–	2.14	2.14	–	2.4
Hin Lat Waterfall	0.52	0.52	–	1.92	1.92	–	2.4
The Phra Yai Meditation Center	4.79	4.79	–	2.21	2.21	–	7.0
Total	9,137.57	3,570.57	5,567	2,070.27	1,012.27	1,058	11,207.8
Inland conservation (5)	–	–	–	–	–	–	25,051.0
Ocean conservation (6)	–	–	–	–	–	–	2,000.0
The total area	–	–	–	–	–	–	38,122.8

Note: (1) Analysis from the physical condition.
(2) The appropriate specific area for maintenanced the service and activity, (including the Na Thon Market).
(3) An appropriate service area consist of accommodation, restaurant, shop and other service.
(4) An appropriate area for the activities i.e. beach and mountain.
(5) The most is mountain and preservation forest.
(6) The total length of the coral reef is 50 kms. (Ko Samui is 34 kms. Ko Ten and other is 16 kms. Average width is 60 m.)

3.2 *Tourism market*

Based on the secondary data collection, field inspection and assessment of the hypothesis, the number of tourist who visited Ko Samui in 1987 was 187,509, comprising of 114,245 Thais and 73,264 foreigners, and averaged 514 people per day. The highest number of tourists reached 2,953 on the new year day. The highest daily average number of tourist was 1,254 during the month of April. Based on the length of stay, the average number of tourists for Ko Samui was 3,544 man-day/day. The highest average was 5,913 in April (table 2).

The project future trends indicated that, the number of tourist in Ko Samui will increase, with the similar ratio of Thai and foreign tourists as in 1987. It was estimated that the rate of increase will reduce from 17.5 per cent per annum in 1988 to 8.0 in 2001 for the Thai tourist, and from 19.46 in 1989 to 14.4 in 2001 for foreigners. Thus, there will be approximately 342,151, 642,586, and 1,114,893 tourists visiting Ko Samui in 1991, 1996 and 2001 respectively, as shown in table 3.

3.3 *Tourism carrying capacity in various attraction places*

Attraction places in Ko Samui were classified into 4 types, i.e. beach, waterfall, mountain and cultural. The methods of study along with the results of assessment for carrying capacities of various factors related to the attraction places are given below.

3.3.1 *The beach attraction place*

While studying attraction places on the beach considerations were given to the following inter-related zones.

(1) Sea: No correlation was found between sea water contamination (based on the amount of coliform bacteria) and the number of tourists on the beach. The finding indicated that changes in the number of tourist had no effect upon the level of contamination of sea water along the seashore. Further study was thus concentrated mainly on the number of tourists in the service area.

(2) The beach area: Since the environmental quality in this area remained in perfect condition, the study on this aspect depended mainly on the attitude and satisfaction of the tourists. The maximum density satisfied by the tourist was estimated at 233 people/rai/day, much higher than the current density (18.07 people/rai).

Table 2. Estimation of the number of tourists arrival at the island and their length of stay in 1987

Month	Number of tourist arrival at the island (1)						Number of tourist (man-day/day) (2)		
	Per month	Maximun	Minimum	Average/day			Thai	Foreigner	Total
				Total	Thai	Foreigner			
January	23,131	2,953	244	746	460	286	1,156	3,932	5,088
Febuary	19,782	2,898	304	707	441	266	1,105	3,665	4,770
March	22,188	2,310	352	716	450	266	1,128	3,664	4,792
April	37,624	2,862	527	1,254	1,008	246	2,531	3,382	5,913
May	15,025	1,240	74	485	398	87	918	1,200	2,118
June	7,933	463	115	264	137	129	348	1,767	2,115
July	7,613	490	127	246	96	150	239	2,068	2,307
August	11,292	590	238	364	154	210	387	2,892	3,279
September	8,442	454	53	281	114	167	287	2,300	2,587
October	12,737	1,184	246	411	219	192	549	2,646	3,195
November	10,178	474	193	339	153	186	385	2,559	2,943
December	11,564	1,380	127	373	149	224	373	3,084	3,457
Total	187,509	2,958	53	514	313	201	786	2,758	3,544
Tourists man-day	–	–	–	–	–	–	287,021	1,006,654	1,293,675

Source: (1) Estimated from the number of tourists on daily average at the Na Muang Waterfall and the boat passengers arrival at Ko Samui.

(2) Estimated from the average length of stay, 2.51 days/man for Thai tourists, and 13.76 days/man for foreigners (Master Plan for Tourism Development of Ko Samui/Surat Thani, 1985).

Table 3. Prediction of the number of tourists at Ko Samui from 1988 to 1991

Year	Total		Thai		Foreigner		Overall average man/day
	Number	Increasing rate	Number	Increasing rate	Number	Increasing rate	
1987	187,509	–	114,351	–	73,158	–	3,544
1988	217,362	15.52	134,402	17.5	82,960	13.4	4,052
1989	254,980	17.31	155,874	16.0	99,106	19.5	4,808
1990	296,447	16.26	178,848	14.7	117,599	18.7	5,663
1991	342,151	15.42	203,410	13.7	138,741	17.8	6,629
1992	391,420	14.40	228,547	12.4	162,873	17.4	7,712
1993	445,569	13.83	255,195	11.7	190,374	16.9	8,932
1991	505,099	13.36	283,428	11.1	221,671	16.4	10,306
1995	570,566	12.96	313,325	10.5	257,241	16.1	11,852
1996	642,586	12.62	344,968	10.1	297,618	15.7	13,592
1997	720,011	12.05	376,613	9.2	343,398	15.4	15,535
1998	805,095	11.82	409,846	8.8	395,249	15.1	17,719
1999	898,653	11.62	444,736	8.5	453,917	14.9	20,170
2000	1,001,584	11.45	481,349	8.2	520,235	14.6	22,922
2001	1,114,893	11.31	519,758	8.0	595,135	14.4	26,010

Note: (1) The market share of Thai tourists increases 0.07081 per cent per annum.
(2) The market share of foreign tourists increase 0.020592 per cent per annum.

(3) The service area: Accommodation facilities are located in this area and were analysed as follows:

- The density of service buildings: The facilities at present can accommodate on the average 17.67 people/rai (ranging from 6.33 to 50.26 people/rai on various beaches). However, more facilities can be built under the regulations of the overall city plan (being designated as the low density residential area with floor area ratio (FAR) under 0.8, and the ground cover ratio (GCR) not exceeding 40 per cent, or with height no more than 3 stories.

- Disposal of sewage at the level not harmful to the environment: Assessment of sewage disposals at Hat Na Ton, Ko Samui and Hat Pa Tong, Phuket yielded the conclusion that beach attraction places without sewage treatment system should not carry more than 12.7 tourists/rai, or 6,000 people at one beach area.
- The refuse, amounted to 2.56 litres/man/day at present, is not being thoroughly collected.

With the fact that the ratio of the service: beach area is 1: 0.255, and the length of resting on the beach of each tourist is 5 hours and 39 minutes, conclusions on the carrying capacity can be drawn from the results of the studies in (1-3). The capacity of service area is 75, 57 and 36 tourists/rai for the 3 levels of satisfaction, i.e. low standard, desires of the tourists at present, and comfort level respectively.

3.3.2 *Waterfall attraction place*

The Na Muang Waterfall, representing this type of attraction place, covers 7.2 rai including 4.81 rai of preserved forest area, 0.25 rai of service area and 2.14 rais of tourism service area. A tourist prefers to stay on the average of 1.5 hours here. The carrying capacity is considered from appropriate levels of area used by the tourists without creating uncomfortable and unpleasant atmosphere.

(1) Service area can accommodate 12 cars at a time or 80 per day.

(2) Activity areas can carry 1,066 tourists per day, or 160 tourists at a time including 30 at the waterfall, 90 along the creek, and 40 in the park.

(3) The satisfaction level of the tourists is limited at 60 people at a time or 533 a day.

In conclusion, the physical condition of the area can carry higher number of tourists at present because the tourists' satisfaction limit has not been reached. The results of this study indicated that the maximum carrying capacity of the waterfall attraction place based on the tourists' satisfaction is 80 people at a time, or 533 per day, or 33 per rai (service and activity area).

3.3.3 *Mountainous and forest attraction places*

The reserved forest at the Hin Lat Waterfall is the representative of this type of attraction place. The entire area consists of 2.44 rais for tourism, 0.52 rai for services and 1.92 rais for activities. A tourist spends on the average of 1.6 hours here. The capacity of this area is assessed as follows:

(1) Service area can accommodate 28 cars at a time or 175 cars a day. Commercial shops can serve 36 tourists at a time or 225 a day.

(2) Activity area includes hiking trails, accommodation facilities and the waterfall which can carry 120 tourists per hour or 1,040 per day. The south end of the creek can serve 120 tourists at a time or 750 tourists per rai.

(3) The tourists are satisfied with the tourist density of 113 people at a time in the activity area.

Therefore, the maximum carrying capacity of the Hin Lat Waterfall is 293 tourists at a time or 1,826 per day.

3.3.4 *Cultural attraction place*

The Phra Yai Meditation Center at Ko Fan is the study area covering 4.11 rais where a tourist on the average spends 2.4 hours. The carrying capacity of this area is assessed as follow:

(1) Service area: The resting shelter can accommodate 90 tourists per day. The total of twenty commercial shops can serve 200 tourists at a time or 833 per day.

(2) Activity area: The area around the Buddha Statue and the rest area can accommodate 472 tourists at a time.

(3) The tourists are satisfied with the density of 180 people at a time or 750 per day.

It is concluded that the maximum carrying capacity of this place is 672 tourists at a time or 2,800 per day.

3.4 *Tourism carrying capacity of Ko Samui*

The assessment was made from two approaches i.e. from related factors at the island level, and from compilation of data from various attraction places.

3.4.1 *Assessment of factors at the island level*

(1) Water supply: Surface and underground water sources can provide potentially 43,849 cu.m./day during the dry season. However, water uses are not well managed. Water supply is available only in the Na Ton Market area. Water is not well distributed, causing water shortage in the

dry season and consequently the conflict between the local residents and the entrepreneurs. Further tourism expansion will probably exceed the capacity of the current water supply. However, available raw water sources can be utilized to provide adequate water supply under proper management.

(2) Electricity: Distribution capacity through the under-water cable is 8 Megawatts, but only 2 Megawatts are being distributed at present.

(3) Road: The present roads can carry heavier traffic, but are rather narrow. Driver discipline and vehicle condition are causing high number of accidents at present (the average death and injured are 108 cases/month).

(4) Bus service: There are 81 buses capable of carrying 3,744 people/day. Overcrowding and shortage of buses occur on certain periods of time. It the running schedule is improved, the current number of bus is still adequate for the current demand.

(5) Passenger boat: The current carrying capacity is 2,850 passengers/day. During the peak season, the number of trips can be increased to take up to 5,950 passengers/day.

(6) Accommodation service: There are 2,966 room to accommodate 5,932 tourists/day. Future expansion is expected to reach 3,317 and 6,113 rooms in 1991 and 1996 respectively.

(7) Public Health and safety services: At present, the services in these areas are adequate. However, if the number of tourist increases to 999 man-day/day and 460 man-day/day, more medical and police services will be required respectively.

(8) Refuse: The tourists generate 2.56 litres/man/day for the total of 9.4 litres per day, but the Sanitary District can collect only 25 per cent of the total. The remaining must be disposed by the enterpreneurs or by the private garbage collectors. The amount of refuse at present is beyond the disposal capacity, and causing problems.

(9) Coral and wild animals: Tourism has very little effect on the coral and wild animals. Only 2.03 per cent of tourists, or 8,640 tourists/year came to see the coral.

(10) The attitude of local residents toward tourism expansion: The local residents agree with tourism expansion, even though only 20 per cent of the population benefits from tourism in terms of employment and additional income. Tourism has caused several problems i.e. higher costs of living, moral deterioration, gambling, drug addicts and accidents. Moreover, conflicts in the utilization of resources, and services were seen in some areas. Therefore, concerns should be given to the adverse effect of tourism expansion on the local residents.

It is concluded that the problems on refuses, and water supply are the limiting factors of tourism in Ko Samui at present. The problems can be solved by increasing the capacity though better management, as well as availability of additional budget, and better marketing mechanism. Some improvement that are proposed or can be made are as follows:

(1) Water supply will be developed to serve 14,200 people/day and 41,700 people/day under the Provincial Water Works Authority (PWWA) Project and the Water Resource Development Project respectively.

(2) Road, bus and passenger boat services will serve twice the current number of tourist after improvement.

(3) Accommodation can be increased according to the market demand within the proper development framework.

(4) Refuse collection service can be expanded with provision of additional trucks and improvement of collection schedule and frequency. However, the Sanitary District must prepare and provide for better disposal system and disposal site.

3.4.2 *Integral analysis of the attraction places*

(1) The beach attraction place: There are 7 main beaches and several other small ones scattered around the island, and covering over the total area of 9,132 rai, including 3,565 rai of short-term service area and 1,006 rai of short-term activity area. Assessment made from 3 levels of density revealed that the beach attraction places can carry at least 89,856 to 187,200 man-day/day, or 44,928 to 93,600 rooms for accommodation. If the density is considered from the data on sewage system, Ko Samui can carry at least 31,693 man-

day/day or have 15,846 rooms for accommodation.

(2) Waterfall, mountain and cultural attraction places: This group of attraction place can serve a total of 3,860 people/day, or 40 per cent of the total tourists. Thus, Ko Samui should have the tourists on the average of 9,650 man-day/day. Capacity expansion can be achieved with provision of additional attraction places, and better distribution of tourists into every attraction places.

Figure 1 illustrates different levels of tourism capacity assessed from various factors, and expected numbers of tourists traveling to Ko Samui on the average and during the peak season. This comparison indicates differences in the carrying capacity of various factors under the present management and after expansion.

Water supply and refuse disposal problems are ranked high in priority because the current demand has already exceeded the existing management capacity of the authorities concerned.

3.5 *Selection for appropriate level of carrying capacity*

3.5.1 *Selection method*

The selection method is based on the factors which are limiting to tourism development e.g. two levels of water supply (development level under the PWWA project, and full-scale development level). In addition, the principles of environmental are also applied in selecting tourism levels (based on the number of tourists) which require social minimum cost. The selected levels of carrying capacity are identified as follows:

(1) The minimum social cost requires that the number of tourists at Ko Samui must not exceed 342,151 (predicted year 1989), or maximum 10,916 man-day/day, or an average 6,468 man-day/day or average number of tourist 937.4 man/day.

(2) The expected amount of water supply (under the PWWA project) at 5,000 cu.m./day, is sufficient for the tourists up to 14,200 man-day/day during the tourist season, or the number of tourists predicted for the year 1994 with an average 9,550 man/day or maximum not more than 10,916 man-day/day.

(3) The maximum amount of water supply produced from all six water reservoir at 10,500 cu.m./day is sufficient for the tourists up to 33,360 man-day/day during the tourist season, or averaged 26,000 man-day/day (after the year 2001).

3.5.2 *Selection process*

After comparing the side effects upon other factors and suitability for development, the second level was selected as the tourism carrying capacity of Ko Samui because the investment in developing each factor is more feasible than the third level and results in slightly more improvement than the first level. While the social cost is slightly higher, more positive effects are expected such as the amount of accommodation, income and employment, as shown in figure 2 and table 4.

The carrying capacity at the island level will effect those at the attraction place level. Development in every attraction place should be controlled within the capacity at present. Currently the capacities of the beach attraction places are below their potentials, thus development should be made proportionally at each place.

3.5.3 *The projected direction of tourism*

The tourism carrying capacity at the second level, i.e. maximum density of 14,200 man-day/day, will maintain the identity and typical tourism pattern of Ko Samui, under appropriate and effective management in development process. Expansion of the number of tourists must therefore be controlled within the maximum limit.

Figure 3 illustrates the trends of ideal increases in the number of tourists, as predicted for the medium level. If the increases are controlled to follow the S-shape curve, control measures or reduction in the rate of increase must be put into practice, beginning from the year 1991 (in which the number of tourist will exceed the first level of the carrying capacity). However, if the increases follow the trend at the high level, control measure must be applied immediately.

4. Recommendations

4.1 *The area development*

4.1.1 *Zoning of the tourism areas*

(1) The beach zone: Buildings must not be higher than 3 stories with the surrounding area at least 60 per cent of the total land area, the GCR not exceeding 40 per cent, FAR not exceeding 0.8. This zone is subdivided as follows:

Figure 1. Future trends of the number of tourists base on the threshold limit of various factors at different management level 3

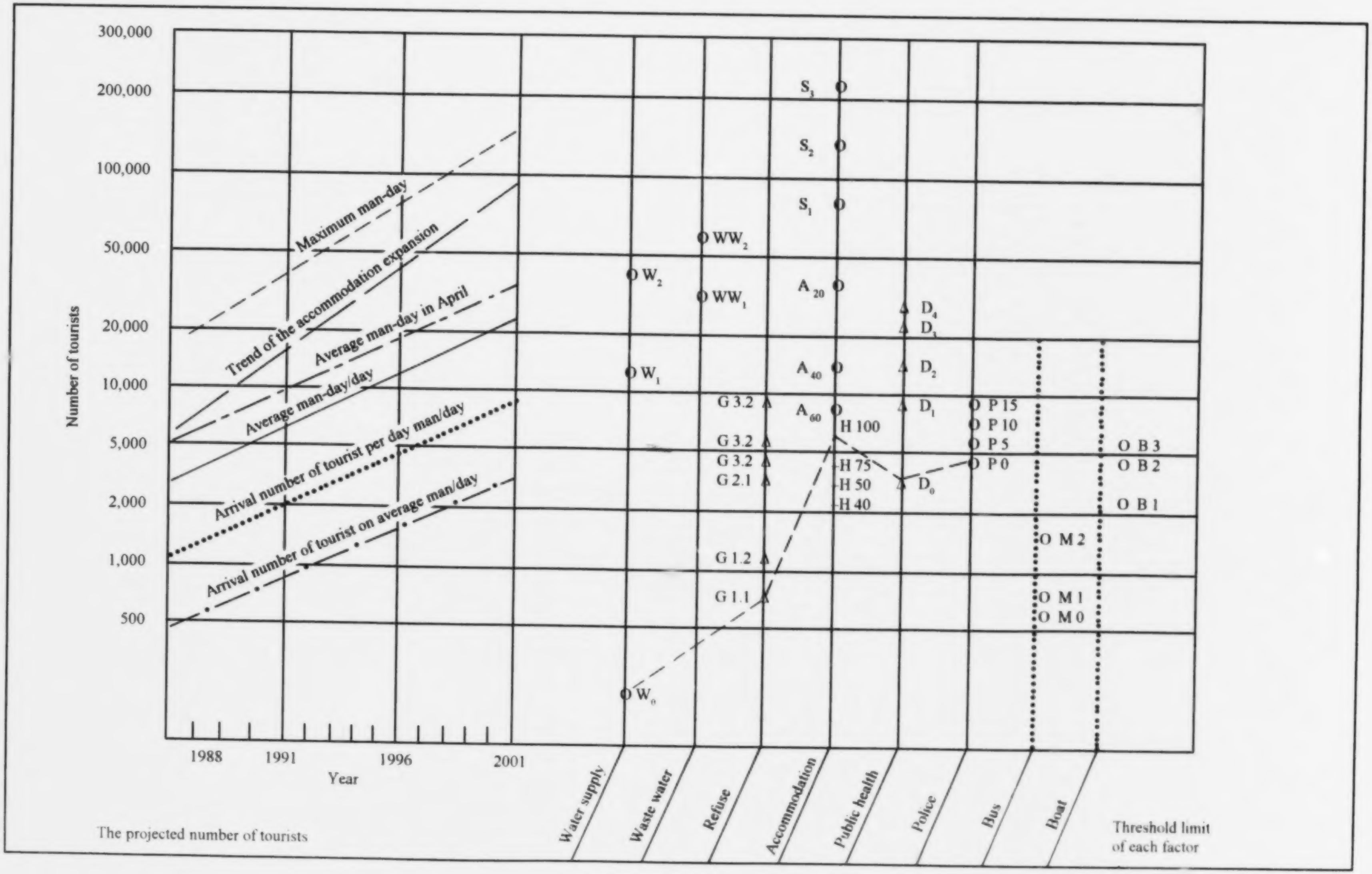


Figure 2. Comparison on the tourism carrying capacities at the 3 different levels

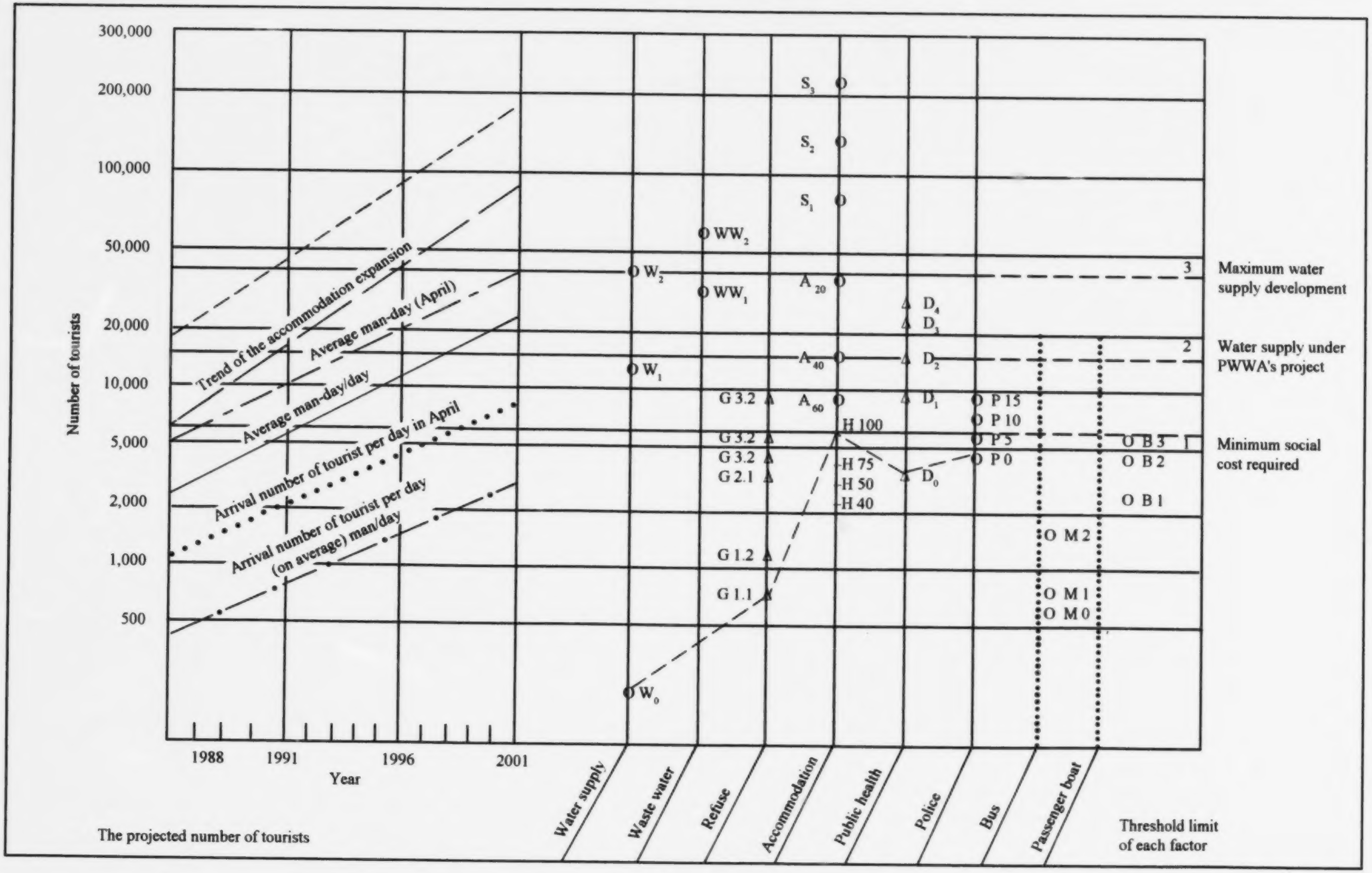
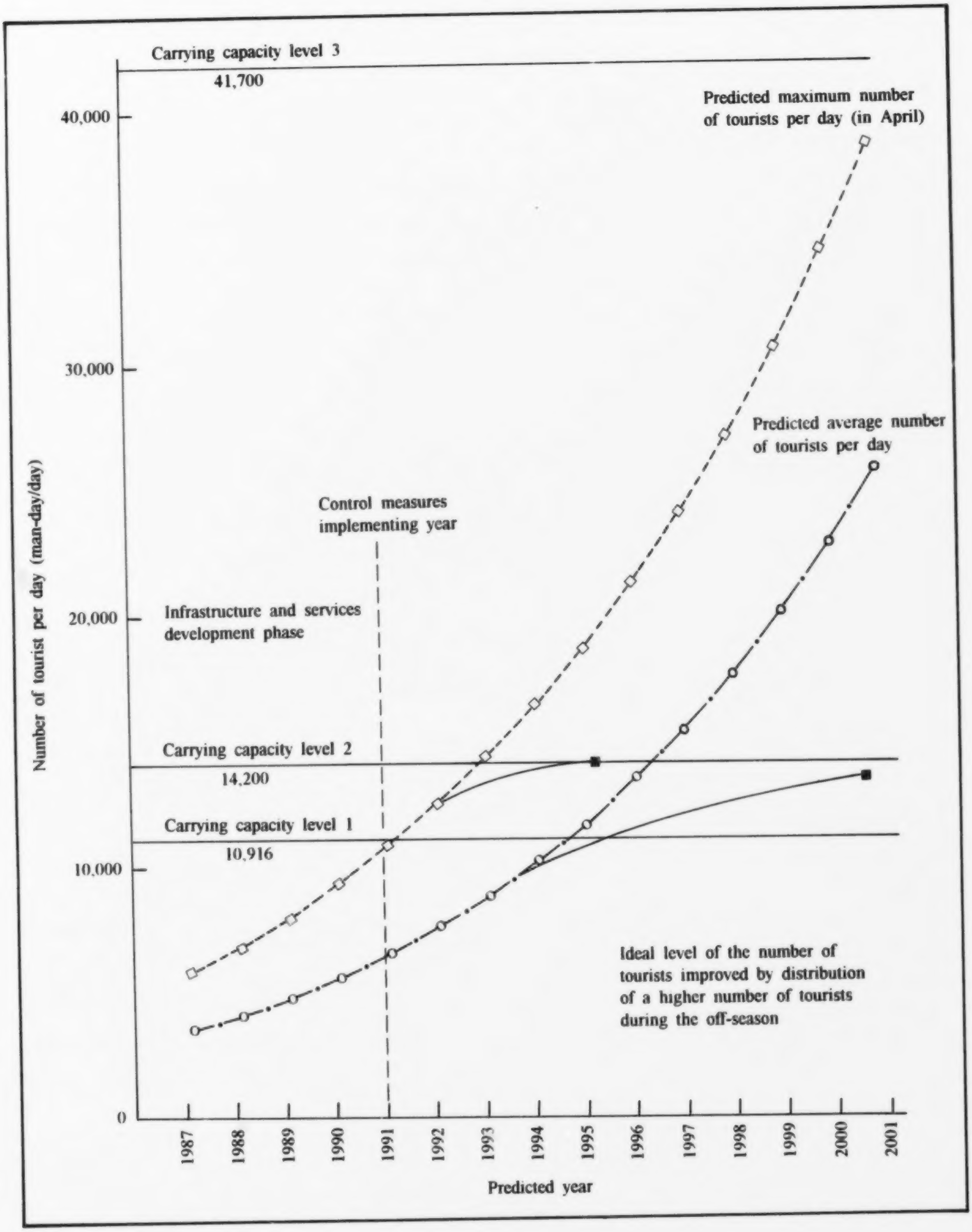


Table 4. Comparison on the management and the anticipated effect among the three level of carrying capacity in the future and the present

Carrying capacity issue	Present condition	Level of carrying capacity		
		1	2	3
1. The year at which the carrying capacity is reached	Year 1987	Year 1991	Year 1994	Year 2001
2. The number of tourist	187,509 man/year	342,151 man/year	505,099 man/year	1.37 million man/year
– Average	3,544 man-day/day	3,544 man-day/day	6,468 man-day/day	26,000 man-day/day
3. The expected number of rooms (60 per cent occupancy rate)	2,966 rooms	5,400 rooms	8,000 rooms	21,000 rooms
4. Water supply				
– Amount of distributed water	–	4,300 cu. m/day	5,000 cu. m/day	10,500 cu. m/day
– Budget	–	66 million baht	74.5 million baht	182 million baht
5. Refuse collection				
– The amount of refuser	Collected 9.4 cu. m/day	17.14 cu. m/day	25.3 cu. m/day	69 cu. m/day
– 2 collecting pick-up	1.88 cu. m/day	2 trip/day	3 trip/day	9 trip/day
– Disposal area	–	1.75 rai/year	2.6 rai/year	4.9 rai/year
6. Sewage treatment	Saptic tank	On site treatment	On site treatment	Central treatment
7. Increase in the number of medical doctors	7 (at present)	1	1	4
8. Increase in the number of policemen	103 (at present)	6	13	53
9. Bus service	91 cars, passenger capacity 3,744 man/day	Improve the running schedule	Improve the running schedule	Increase the number of buses and running frequency
10. Passenger boats	3 route, passenger capacity 2,850 man/day	–	–	Expand double service
11. Averaged service area	17.67 man/rai	2.6 man/rai	3.8 man/rai	10.4 man/rai
12. The acceptance level among local residents	–	Acceptable	Acceptable	Causing problem
13. Estimated income from tourism	347.76 million baht/year	734.7 million baht/year	936.8 million baht/year	2,540.8 million baht/year
14. Labour increase	1,343 man	Increase 1,457 man from 1987	Increase 20,030 man from 1987	Increase 3,723 man from 1987
15. Social cost	3.44 million baht (Damage cost)	5.41 million baht	5.72 million baht	11.53 million baht

Figure 3. An appropriate ideal number of tourists for tourism development of Ko Samui



(1.1) Area 1 covers Hat Chaweng and Hat Lami. The service area can have the number of room not more than 40 bed/rai. At each beach the number of room must not exceed 2,400. Buildings must not be higher than 15 metres with the set back distance at least 15 metres from the beach.

(1.2) Area 2 covers Hat Mae Nam, Hat Bo Put, Hat Bang Rak and Hat Laem Din/Tong Yang, having the density not exceeding 30 bed/rai, and no more than 800, 480, 160 and 640 beds respectively. Buildings must not be higher than 12 metres with the set back distance at least 20 metres from the beach.

(1.3) Area 3 covers Hat Choengmon-Laem Son and other beaches excluding the Na Ton Market, having the density not exceeding 20 bed/rai, and no more than 320 beds at Hat Choengmon-Laem Son. Buildings must not be higher than 9 metres with the set back distance at least 20 metres from the beach.

(2) The Na Ton Market: Buildings must not be higher than 5 stories. Medium density is allowed with GCR not exceeding 70 per cent and FAR not over 1.5. The road along the beach should be at least 20 metre-wide.

(3) Conditions and patterns of various minor attraction places on land and sea should be conserved. Activities around the coral reef should be controlled.

4.1.2 *Land-use control*

To implement the City Plan of Ko Samui. Service areas should be designated in various attraction places with appropriate patterns according to site specification.

4.2 *Infrastructure and service management*

4.2.1 *The government infrastructure and service management*

(1) The PWWA project should be urgently implemented.

(2) Refuse collection should be improved by increasing the frequency of collection, number of trucks, transfer station, and acquiring additional land for disposal either by burning or landfill. The private sector may be considered for taking over this operation with appropriate conditions.

(3) The principal and subordinate roads should be expanded for safety.

(4) Transportation and passenger boat services should be expanded within the framework.

(5) There should be at least 13 policeman and one doctor available.

4.2.2 *Tourism services*

(1) Entertainment activities should be controlled into certain areas identified as the tourism service center of every beach, covering no more than 5 per cent of the total area.

(2) Accommodation should be gradually expanded, but it should not exceed to more than 8,000 rooms with proper standard.

4.3 *Development management*

Local administrative structure should be reorganized by abolishing the existing sanitary districts, and establishing two sanitary districts, i.e. the east and the west, whose boundaries are shown in figure 4. In the long run, they may be raised to the municipal status or a new and special kind of administration formulated with the concepts of development and conservation.

Control measures should be established, by the authority of the concerned organizations in the central and provincial administration, for building construction, landuse, and environmental protection especially in various attraction places.

4.3.2 *Budget*

(1) The capacity should be increased for higher local revenue. Greater financial support from the central government should be sought to compensate for the adverse effect being inflicted on the locality.

(2) Direct and indirect incomes from the tourists should be increased such as garbage collection fee (0.75 baht/day), medical fee, bus fee and the island entry fee.

(3) Appropriate budgets should be allocated for tourism development as well as rural development for mutual benefits of people in Ko Samui.

4.4 Follow-up study

Tourism development of Ko Samui should be continuously monitored for necessary adjustment to allow better coordination among involved organizations. There should be specific studies on tourism market, services, social effects and changes in environmental quality.

4.5 Proposals for further studies on the carrying capacity

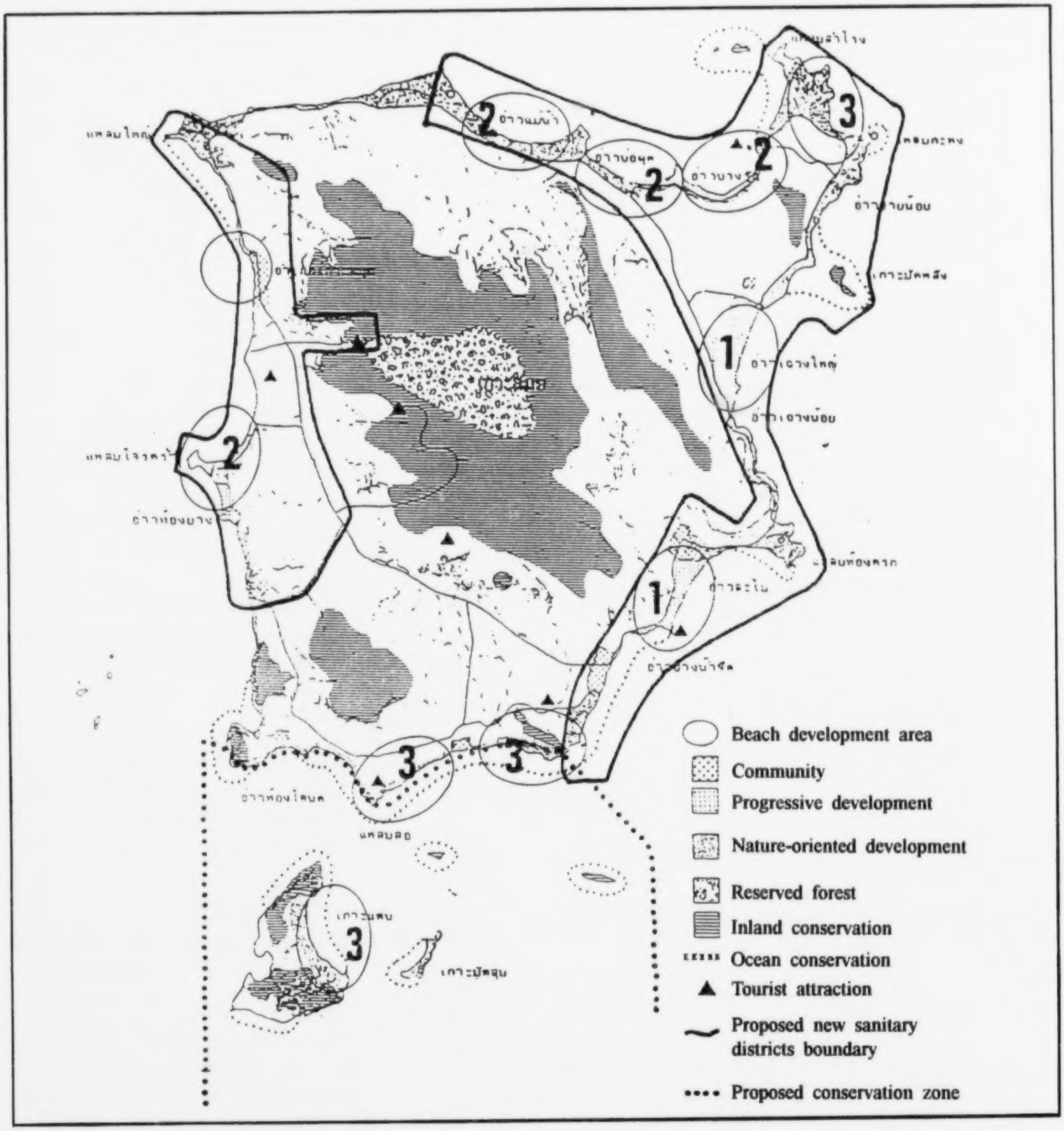
(1) Comparative study should be made at various attraction places of the same type at the national level.

(2) The capacity of specific factors should be studied such as the ecological system of forest and wild animals, distribution of coliform bacteria in the sand and the social effect of tourism.

(3) Various standards related to the tourism carrying capacity should be examined.

(4) The concept of tourism carrying capacity should be publicized, especially to the agencies involved in tourism development.

Figure 4. Zoning of the Tourism area and proposed new sanitary districts



1
2
3
○ Beach development area
Community
Progressive development
Nature-oriented development
Reserved forest
Inland conservation
Ocean conservation
▲ Tourist attraction
Proposed new sanitary districts boundary
•••• Proposed conservation zone

ANNEX III

CASE STUDY ON ENVIRONMENTAL IMPACT ASSESSMENT FOR PROPOSED INTEGRATED RESORT DEVELOPMENT AT LANGKAWI ISLAND, KEDAH DARUL AMAN

1. Title of project

The proposed project is for an Integrated Resort Development on lot HS (D) P.T. No. 300 in the Mukim of Padang Matsirat, district of Langkawi, Kedah Darul Aman.

The proposed Integrated Resort Development (IRD) will comprise several different developments to be carried out in stages. The first phase Development would be for the construction of A 375-Room 5-Star Hotel named Mahsuri Westin Resort to be located at TG Belikit. A 3-Star Hotel, residental apartments and bungalows are planned for other phases within the IRD.

2. Project initiator and EIA consultant

The Proposed Development is by:
Leisure Development SDN BHD at
Ground Floor. Wisma Singapore Airlines,
Jalan Dang Wangi,
50350 Kuala Lumpur.
Tel No. 03-2912822 and Fax No. 03-2911819
(Contact Person: Encik Muhammed Ikbal Bin MD. Hamzah)

The Consultant Appointed for the Preparation of the Preliminary Environmental Impact Assessment Report is:

Perunding Utama SDN BHD of
3A-2, Jalan Genting Kelang,
Setapak,
53300 Kuala Lumpur.
Tel No. 03-4219469/4219472 and Fax No. 03-4211869
(Contact Person: Encik Peter Y.C. or Raja Nur Ashikin)

3. Purpose of preliminary EIA resort

The EIA report was prepared in compliance to the requirements of Section 34A of the Environmental Quality ACT, 1974. The proposed Integrated Resort Development is a prescribed activity under item 17(A) of the schedule under the Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) order 1987.

The objectives of the EIA report are to present the findings of the Assessment of The Environmental Impacts likely to arise from the proposed development and to outline measures in mitigating the impacts. In addition, other recommendations or follow-up actions are also proposed for better protection and preservation of the environment. The focus of the present EIA Report is on the development of the 375 Room Mahsuri Westin Resort which represents the first phase of development where a detailed layout plan has been prepared. General conceptual plans are available to enable a comprehensive environmental assessment to be made. Nevertheless, the EIA study takes into account the other developments proposed but quantitative details are confined to the first phase development.

4. Statement of need

Since its declaration as a duty-free port in 1988, Langkawi Island has experienced a surge in economic growth with the tourism industry being the main stimulus. The tourism sector has vast potential for further development in Langkawi in view of the island's uniqueness in terms of its natural resources, pristine environment and historical heritage, with attractions ranging from beautiful sandy beaches, colourful corals, waterfalls and mystical islands.

Langkawi has experienced rapid growth in the hotels industry ranging from simple chalets to Five-Star Hotel. Growth of this sector is important to ensure the success of making Langkawi a foremost tourist destination. The objectives outlined in the Langkawi structure plan favour development to be well-planned rather than being scattered and unorganized as in earlier developments found in Langkawi.

The proposed project ensures balanced development in terms of types of accomodation facilities as well as protection and preservation of the environment. The development aims to attract international tourists and to encourage visitors to stay longer in Langkawi. It is anticipated that such a development would bring about impetus to expansion of other economic sectors such as the retail, commercial and services sectors, besides fulfilling the need to meet accomodation needs of tourists.

5. Project descriptions

5.1 *Location*

The site of the proposed development is located at TG Belikit within the West Coast of Langkawi Island and lies within the coordinates of 60 23.4' N and 990 41.3' E. The project area occupies almost the whole strecth of the sea-front with Pantai Kok to the west and Kuala Teriang to the east (figure 1). Teluk Burau is situated about 3 km west while the airport is approximately 10 km south-east from the site. Kuah town and Kuah jetty are approximately 25 km and 27 km west respectively.

Access to the site is easy since the area is located along the main road between Kuala Teriang and Teluk Burau. Nevertheless, access into and within the site is only possible by foot presently, on the other hand, the site could be accessed by boat.

5.2 *Project concept*

The proposed development is planned and aimed towards an integrated resort development comprising several different components (figure 2) which are as follows:

	No. of rooms/units	Area (AC)	Percentage area
Resort hotel 1	375	29.0	45.52
Resort hotel 2	300	7.4	11.62
Holiday residential A	28	4.1	6.44
Holiday residential B	44	5.4	8.64
Holiday residential C	34	3.6	5.65
Holiday residential D	40	5.0	7.85
Bungalow residential	16	9.2	14.28
Total		63.7	100

Conceptually, about 57 per cent of the total area will be used for the development of the two hotels,

Figure 1. Key plan

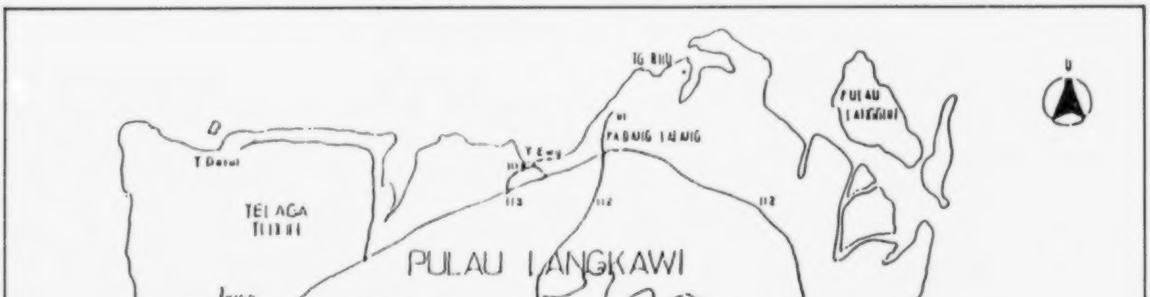
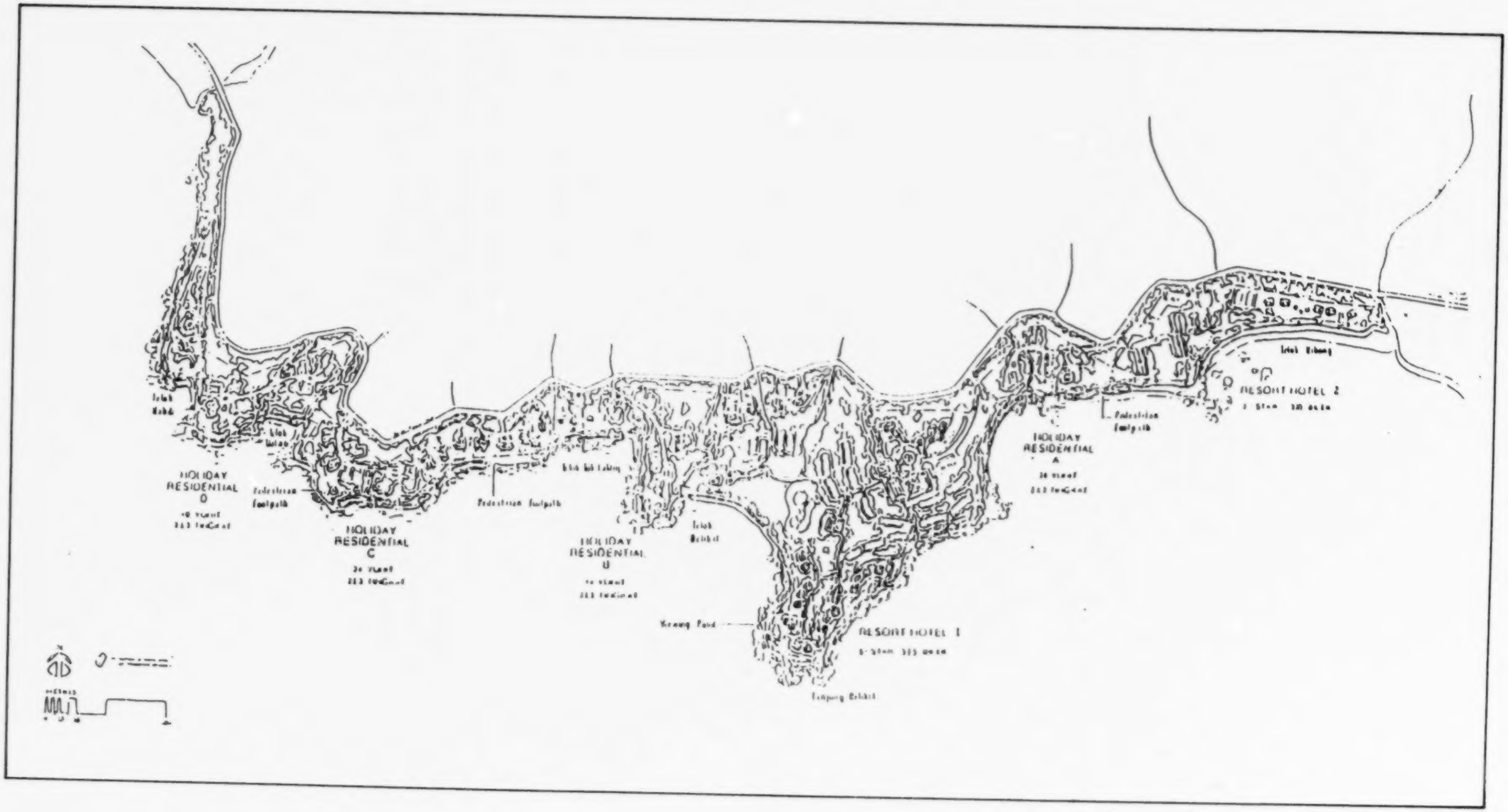


Figure 2. Conceptual plan of overall development


HOLIDAY RESIDENTIAL D
Pedestrian footpath
HOLIDAY RESIDENTIAL C
Pedestrian footpath
HOLIDAY RESIDENTIAL B
Teluk
Kenang Pond
RESORT HOTEL 1
HOLIDAY RESIDENTIAL A
Pedestrian footpath
RESORT HOTEL 2
metres

one of which is of 5-Star ranking and the other 3-Star ranking. Holiday residential units are proposed for four areas. These will occupy approximately 29 per cent of the total area consisting of 2-3 storey buildings, housing some 146 3-room units. Bungalow units will be built for the rest of the area. Overall the density of development in terms of residential units per acre will be low, about 6 units/acre. For the first phase development only resort hotel 1 would be developed. This is in view of its location which is strategically located at the TG Belikit promontory, beautiful white sandy beach and relatively large area which is about 45 per cent of the total available area. The details for the development of other components is yet to be known at the time of carrying out the EIA study. Hence, the focus of the EIA is for the first phase development.

The Resort Hotel 1 will be called the Mahsuri Westin Resort with 375 rooms. The proposed resort is anticipated to attract and cater to international tourists. The resort is designed with an intergated resort concept whereby all the facilities are interlinked although they are built in clusters to provide a web-like or a close-knit environment or atmosphere. This is clearly shown in the layout plan in figure. Integrated resort also means that the resort will offer and provide all the facilities to cater to the needs of the tourists regardless of age, purpose or interest.

The hotel will be equipped with most facilities required to service the needs of visitors. These include a spacious lobby, retail area, restaurants, swimming-pool, ballroom, meeting rooms and executive room, health club and recreational facilities such as tennis courts and beach activities such as sailing and windsurfing, as well as residential facilities for employees.

Buildings proposed will be low-rise from one to three storeys following general topography of the land. Buildings are intended to harmonies with the surrounding area with larger vegetation to be retained. Emphasis will be placed on natural and extensive landscaping. Besides, buildings will incorporate Malaysian Architectural Designs, the Malay "Kampung" concept to be used in the overall design theme for the villas.

To minimise earthworks, no roads will be constructed other than the access from the main road to the main reception building. Linkage between buildings will be by walkways or an internal system of pathways for electric powered carts to transport people and material.

5.3 *Project schedule*

The anticipated project schedule for the development of the first phase in January-December 1992. The project schedules for the other phases of development are still not available. The time frame for the first phase development would be about 18 months. The total estimated time frame for full development of the IRD is about 4 years.

6. Project activities

Four levels of project activities have been identified for the proposed development. These cover:-

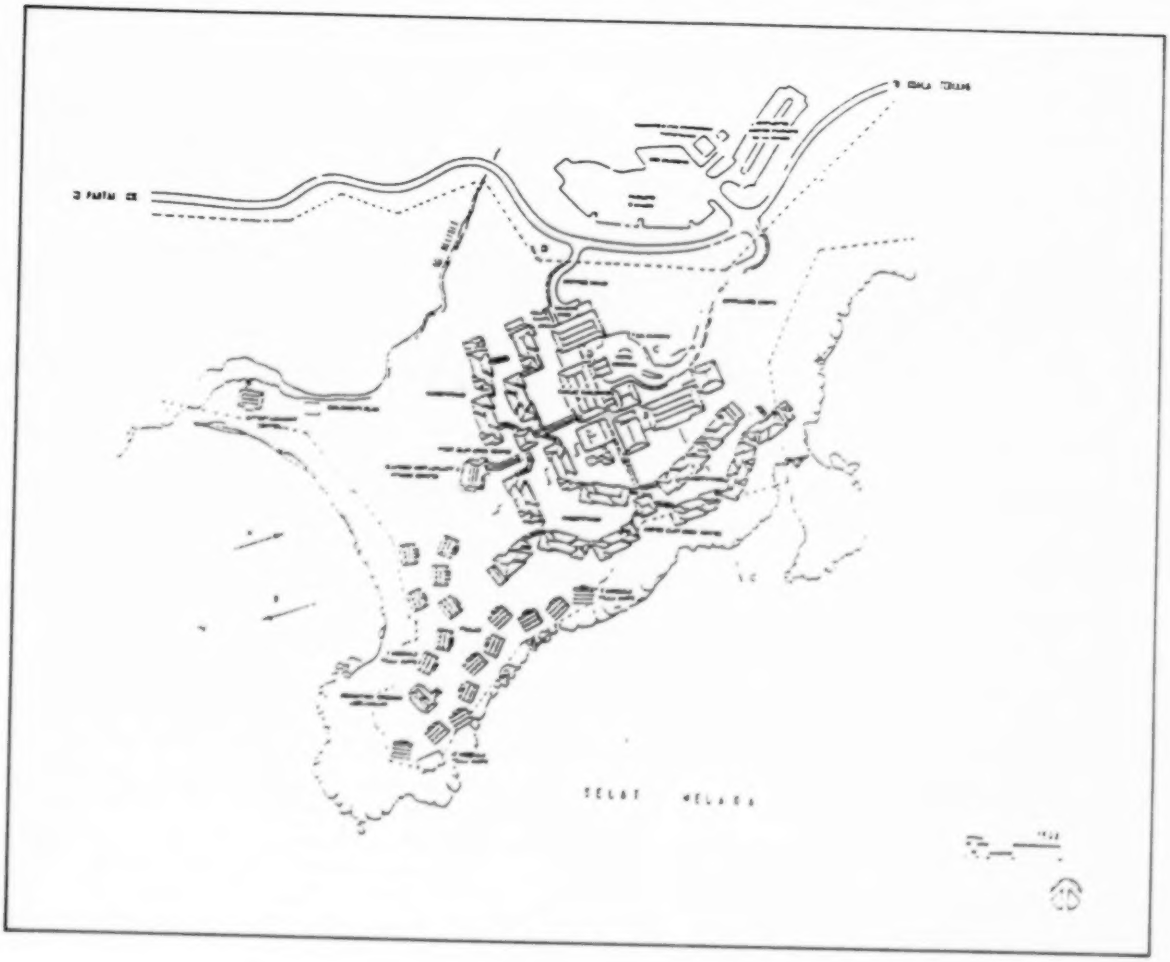
i. Site investigation;
ii. Site preparation and development;
iii. Construction of buildings, infrastructure, utilities and other facilities; and
iv. Occupation and operation of the resort hotel.

The types of project activities that are expected are identified and further elaborated in table 1.

7. Summary of impacts, mitigating measures, recommendation and residual impacts

Table 2 shows the summary of impacts for the proposed integrated resort development at Langkawi Island.

Figure 3. Layout of Mahsuri Westin Resort pase I development



SELAT MELAKA

Table 1. Project activities for the development of Mahsuri Westin resort

Project activities	Description
1. Site investigation	
1.1 Site survey	Ground survey and mapping of area. Activity may require line clearing of vegetation which is largely secondary forest vegetation. Area is densely vegetated.
1.2 Access road	No specific requirement for new access roads since the site can be easily accessed from existing main road to Teluk Burau. However, access into the site is only possible by foot-path due to rough terrain.
1.3 Soil investigation	Activity is minor and will require only small clearing where required.
2. Site preparation and development	
2.1 Access road	New access road is required. Access road would be from the main road.
2.2 Site clearing	Clearing involves mostly low secondary vegetation and shrubs. Cleared vegetation would need to be disposed off. Larger trees will be retained for landscaping.
2.3 Earthworks	Major earthworks anticipated since area is relatively steep. Drilling and blasting expected due to its rocky nature.
2.4 Infrastructure	A main drainage system is anticipated for disposal of surface run-off from the project area.
2.5 Utilities	Water and electricity supplies development will be by connection from the mains along the existing main road.
2.6 Transport	Transport requirements for operation building materials, workers and waste disposal are expected to result in a significant increase in truck traffic within the project area and along the main access road.
2.7 Employment	Construction work will generate substantial employment positions for skilled, semi-skilled and general workers.
3. Construction works	
3.1 Construction activities	Construction activities relate mainly to building construction. Use of various mechanical equipment with high noise rating is anticipated.
3.2 Transport operation	Transport requirements will be significant. Operation for building materials, workers and for waste disposal as well as for machinery and equipment. Movement will be mainly generated from outside the project area and will utilize the main road.
3.3 Disposal of waste	Construction waste generated need to be disposed. Both combustible material and non-combustibles are expected to generated. In addition, waste form human sources would need to be disposed.
3.4 Employment	Significant employment opportunities are anticipated during construction as described earlier. Labour will be sourced from nearby towns and villages.
4. Occupation of hotel and operation of resort facilities	
4.1 Wastewater treatment	Substantial sewage and other and disposal wastes will be generated during operation of the resort facilities and commercial activities. Final disposal could be into the sea.
4.2 Solid waste disposal	Solid wastes will need to be collected and disposed off at the nearest approved disposal site.
4.3 Transport	Visitor/tourist and worker movements will increase significantly along the access roads particularly. Traffic to the area is expected to increase significantly.
4.4 Employment	Employment opportunities within the hotel is projected to be about 600.
4.5 Coastal activities	Activities including swimming, boating, skiing, wind surfing and others are expected to take place along the coast.

Table 2. Summary of impacts, mitigating measures, recommendations and residual impacts

Sources of pollution and project activities	Significant environment	Proposed mitigating measures and recommendations	Residual impacts	Department of environment's comment's
1. Soil erosion				
Earthworks, site preparation and clearing	Moderate to high	Layout planning to emphasize on retaining as much vegetation and buildings to follow natural terrain. Vegetation on slopes along streams and areas adjacent to the sea to be turfed and landscaped. Cut slopes to be protected viz vegetative or structural measures. For road construction, to be immediately paved with crusher run. Number of access from main road to be reduced. A common access is proposed where linkage to the different clusters of residential units will be by foot path.	No significant residual impacts envisaged provided that proposed mitigating measures are strongly adhered to.	
2. Coastal erosion	Minor to moderate	Retention of escarpment vegetation as well as other vegetation along the beach for coastal protection. A minimum 30 m setback for building is recommended for Phase I. Vegetation along slopes adjacent to sea to be retained. No jetty, outfall or surface drains will be constructed into the beach or sea. No drains should be directed to discharge into the beach.	Normal rate of erosion will occur but no significant increase due to project is expected.	
3. Ecology				
Earthworks, site preparation and clearing	Moderate to high	Clearing to be carried out only in areas on which buildings or other infrastructure are to be erected. Buildings to be sited in relation to large tree distribution and according to natural terrain. Habitat of *Lagerstroemi langkawiensis* along rocky coastline to be conserved. Enchanced planting within IRD is encouraged. Revision of residential development is suggested to minimise land clearing and conservation of coastal vegetation. This will assist also in wildlife conservation. Natural vegetation in unused areas to be conserved. Area could be turned into a forest park for tourist or recreational use.	Loss of seaward portion of forest area if total land area is to be developed. Loss of of habitat for *Lagerstroemia langkawiensis* which is a rare species and endemic to Langkawi. However, this impact can be reduced by enchanced planting of the species within the IRD which could be the theme tree for the project.	
4. Water pollution				
Sewage disposal	Major	Sewage treated to Standard A effluent quality and discharge into Sg Belikit or disposed through soakaway. Regular monitoring of the effluent is required.	Significant impact to water quality if sewage treatment is inefficient.	
Surface runoff	Minor to moderate	Surface drains will be constructed with final discharge into Sg Belikit or other streams. During project development, temporary measures such as swales and detention ponds will also be incorporated.	No residual impacts anticipated.	

Table 2 *(Continued)*

Sources of pollution and project activities	Significant environment	Proposed mitigating measures and recommendations	Residual impacts	Department of environment's comment's
5. **Solid waste**				
Site clearing and construction	Minor to moderate	Burning for agricultural and construction waste should be under controlled conditions. Construction materials not be allowed to be disposed in the beach area. These requirements should be stipulated in the contract documents for construction of resort.	No residual impacts expected.	
Resort operation	Minor	Solid waste collected by MDL for disposal.	No residual impacts envisaged.	
6. **Drainage and floods**				
Construction and resort operation	Minor	Additional runoff during construction to be conveyed and contained in detention ponds prior to discharge into receiving waters for protection of water quality. Surface drainage system incorporating sediment traps and rubbish traps proposed.	Residual impacts can be managed.	
7. **Noise**				
Site clearing	Minor	Suggest site clearing operations to be restricted to daytime onlys.	No residual noise that will affect human habitation.	
Earthworks	Minor	Confine earthworks to daytime.	Impacts of no significance.	
Construction	Minor	Construction activities which are noisy to be carried out during the daytime preferably not to exceed 2000 h. Workers handling noisy machinery should wear ear plug.	Acceptable residual noise.	
Construction	Minor	Control of traffic speed to 30 km/hr along the Teluk Burau-Kuala Teraing road and heavy truck movements during construction.	Residual noise will be tolerable.	
Traffic during operation	Minor	Allocation of buffer strip along the road. Leafy shrubs can be closely planted for screening as well as aesthetic purposes.	Residual noise expected to be within WHO acceptable levels.	
8. **Air pollution**				
Site clearing and earthworks	Minor	Wetting of unpaved roads frequently used by motor vehicles.	No residual impacts expected.	
Waste burning	Minor	Combustible wastes such as agricultural and construction wastes not to be burnt. However, if burning is required this to be in small quantities and downwind of residential houses. Preference time for burning is when land breezes dominate.	Residual impacts not significant. Some smoke may be a source of nuisance if burning is improperly done.	
Traffic	Minor	Access road to be paved preferable before construction activities start. Tyres washing facilities should be provided at the entrance point. All other frequently used routes within development area should be wetted to prevent dust generation.	Minimal residual impact if practices suggested are fully implemented.	
9. **Social conflicts**				
Employment	Significant enhancement of employment and local business	Provide employment opportunities during construction and operation of resort to locals. Business opportunities for locals to provide services.	No significant residual impacts anticipated. Local fishing is minimal in the area and away from the beach.	

ANNEX IV

A SUGGESTED EIA GUIDELINES FOR EXISTING BEACH RESORT HOTELS

(From Environmental Technology in Developing Countries,
Volume 2, Ludwig, H.F. *et al.* (1987),
SEATEC International, Bangkok)

1. General information

Name of responsible project personnel interviewed. General information should include: number of rooms and "minimum required per cent occupancy" for hotel to stay in business; when hotel was/to be built; how long the personnel interviewed have been on the job or in similar industry; class of hotel; source of customers (international or domestic).

2. Environmental base map

(a) Map of hotel layout, which can be in schematic form showing the layout of rooms, yard, and hotel facilities.

(b) Map of environs around hotel showing location of hotel, in relation to roads, land uses, beach, and other features important to EIA.

3. Water supply system

(a) Schematic sketch of system showing sources, hotel water treatment facilities (if any), storage tank, distribution system, quality and quantities used.

(b) Drinking water in room/safety; How does hotel management ensure safety of water used for drinking? If water from tap used for drinking, what monitoring is done to check its safety (chlorine residual and/or coliforms tests). Is there a sign in bathroom indicating that water is not safe for drinking if it is not?

(c) If water is purchased from vendor, what is done to be sure that the water is safe (coliform tests)? Is it to be/being chlorinated by hotel management?

(d) Is water supply delivered to kitchen chlorinated by hotel management? (it should be).

(e) What water is drunk by the hotel working staff: if different from 3.(b), is it chlorinated: (if taken from piped water system, it should be).

(f) Hotel management should ensure daily chlorine residual records of all piped water which is used for drinking by guests or by hotel working staff (very important in case of lawsuits.) Same for water supply to kitchen.

(g) Take samples of raw water and of treated water for test of coliforms and chlorine residual. For raw water also total dissolved and chlorine. Also chlorine residual and coliforms in some taps and in water supply to kitchen.

4. Swimming pool

(a) How does hotel management ensures that water supply in pool is safe? Assuming chlorine is used, how does hotel management ensures that it is being added properly, that it will be on hand when needed (not run out). Are there daily chlorine residual records? (there should be).

(b) Size/Volume of pool and amount of chlorine/day and dosage in ppm. When is pool operated (hours)?

(c) Any complaints in hotel history about diseases said to be contracted in pool. Any complaints of any kind? Describe.

(d) Is drainage around pool drained away from pool (as it should be), or if it's toward pool, how is it kept out of pool?

(e) Any hazard of slipping around pool?

(f) Special pool for children?

(g) Provisions for preventing drowning (lifeguards).

(h) Water supply to pool, from where? Is it filtered? How often is it changed?

(i) Clarity of water in pool. Should take sample and measure for turbidity, but also record visual clarity.

(j) Is foot-bath used? Do all people using pool have to step in it? Any other public health precautions?

(k) If chlorine not used, does pool water color change?

(l) Any complaints about too much chlorine?

5. **Disposal of sanitary wastes (from toilets and from kitchen)**

(a) Describe system using schematic sketch including sizes, retention periods, and all other salient basic design criteria.

(b) If leaching pits (LP) or septic tank/leaching system (ST/LS) is used, check size of tank (RP = retention period should be not less than 16 hours). Check Adequacy of leaching area in sq.m/capita. How is system operated and maintained? What records are kept on operation and maintenance (O&M)? How often does the pit or tank have to be pumped out? Who does pumping? What happens to the pumpage (material pumped out)?

(c) If LP or ST/LS are used, are any of these located close to water supply wells? If so, use schematic sketh to show details.

(d) Are any wastes discharged into adjacent storm-water drainage system? Describe. (This is acceptable for shower waste but not for kitchen wastes).

(e) If sewage treatment plant (STP) is used, give engineering description with schematic sketch. Who does O&M (describe)? How does hotel management know O&M is actually taking place, that is, who monitors the O&M and are there O&M records on this? What happens to STP during power failure (blackouts/blownouts)? Is final effluent chlorinated? Where is final effluent discharged and what is the impact of this on environment?

(f) During rainy season does groundwater rise to levels which makes that LP or ST/LS not workable? What is done about this? Do the toilets ever not drain out when flushed? When, why, how is problem solved?

6. **Complaints**

(a) What is history of complaint received by hotel management (other than for "poor service") including complaints about (i) sickness due to water in room, (ii) sickness due to food, (iii) noise, (iv) flooding problems, (v) traffic problems, (vi) cleanliness of beach, (vii) density of people on beach (too many), (viii) cleanliness of swimming pool and safety in using it, and diseases from same, (ix) inadequate occupational health programme, and any other. Get details on each significant event. (Complaints are the best source of real information and adverse environmental effect).

(b) Any newspaper articles about hotel ever on complaints or adverse environmental effects? If so, get details on each one.

7. **Traffic and parking**

(a) Any history of traffic problem including (i) problems making it difficult for visitors to come to hotel, and (ii) effect of hotel traffic in impairing traffic movements of those not visiting hotel (other business)? What was done about solving these problems?

(b) Make traffic counts at some busiest time at the place of heaviest hotel traffic, and on same street at place beyond influence of hotel, to get difference. Is difference significant? Explain.

(c) How is parking problem handled? Explain.

8. **Noise**

(a) Noise problems which disturb hotel guests and hotel noise which disturb others. What was done about any problems?

(b) For noise problem due to traffic, measurements as in 7. (b) At "noisiest place" and in similar place. Is the difference significant? Explain.

9. **Solid waste disposal**

(a) If a local system is used, give engineering description. How does hotel management ensure good O&M?

(b) If someone comes to collect waste and take it away, who furnishes this service and how satisfactory is it?

10. **Food sanitation**

(a) History of sickness: Any cases of sickness said to be caused by eating in hotel. Get details on each case. Go back to beginning of hotel's operations.

(b) Does Health Department make periodic inspections of "Kitchen Sanitation"? How often, what do they do, caliber of inspectors, any value to hotel management, any fines or penalties?

(c) What is the programme by hotel management for teaching food handling staff to prepare and serve food in a sanitary manner? In particular, check on the adequacy of refrigeration facilities. Are any foods prepared in advance and stored warm to be eaten later, like stuffed lobsters, stuffed chicken, or Hollandaise sauce? This type of thing causes more hotel food poisoning problem than any other source, even is luxury hotels. Do hotel management and Chef know about hepatitis and that the main cause is eating of shellfish that is half-cooked?

(d) What does hotel management do to ensure that a food handling staff member who is sick will not come to work when he is sick?

(e) Make inspection of kitchen to check on kitchen sanitation.

11. Security

(a) Describe hotel's security system to protect guests and itself againts robbery and other illegal acts? Describe in some detail.

(b) Does hotel have its own Hotel Detective? If so, what hours does he work.

(c) Give detailed history of robbery incidents at hotel.

12. Occupational health

(a) How does hotel management ensure that working staff puts in the prescribed hours of work and does efficient work?

(b) What are provisions for water supply for washing and flushing toilet, especially for food handling staff. Sanitation facilities for food handling staff are very important.

(c) Insurance, compensation, and sick leave policies and programmes.

13. Beach area quality

(a) Complaint of guests on sanitation of beach sand or water? Describe.

(b) How is litter removed from beach? How often? When? How satisfactory is this?

(c) What has happened to "visual beach quality" over the years? Is water less clear? Has its color changed? Is beach dirtier?

(d) Where is the main source of litter, i.e., hotel quests or others?

(e) Does hotel exclude or try to exclude public? Discuss.

(f) Is public access to the beach a problem to the guests and hotel management? Describe.

(g) Do the guests prefer to use the beach or instead use the pool or drive to a cleaner zone? Give details.

14. Storm water drainage (Use schematic sketch)

(a) Describe system

(b) Describe any flooding problem that inconveniences guests.

(c) Did building of hotel create any flooding problems for neighbors?

15. Medical assistance

How does hotel management handle problem of guests who become seriously ill?

16. Insurance programmes

What kinds of insurance does hotel have and for what purposes? (Don't need financial details).

17. Other environmental effects

(a) Describe any instance/complaints of adverse effects on neighbors due to:

- Traffic
- Noise
- Blocking view
- Ruining of environmental aesthetics
- Flooding

Any other problems such as hurting neighbor's business, reducing his/her land values, etc. What was done about it? How was it handled?

(b) Any adverse impact by hotel activities on:

  (i) Wildlife/forest in vicinity? (As by hikers).

  (ii) Beach values such as shadows from hotel buildings covering beach and encroachment of buildings on beach, and any other reasons.

  (iii) Marine aquatic ecology including corals.

(c) Any evidence of impairment of beach values due to offshore oil spills from tankers or ship? Due to local recreational boats like motor boats? Give details. What was done about it?

(d) What are guests' views on use of beach and offshore waters for:

* Swimming
* Small boats — Motor boats
  — Paddle boats
  — Sail boats
* Flying with big kites
* Water skiing
* Any others.

ANNEX V

COASTAL WATER QUALITY AND EFFLUENT STANDARDS IN THAILAND AND MALAYSIA

Table 1 - 4

Table 1. Costal water quality standards in Thailand

Parameter	Preser-vation	Conservation of coral community	Conservation of natural area	Agri-culture shellfish	Water-contact sport	Water-proximity sport	Industry
Class	1	2	3	4	5	6	7
Floatable solids	n	NOB*	NOB*	NOB*	NOB*	NOB*	NOB*
Floatable oil/grease	n	NV	NV	NV	NV	NV	NV
Colour/odour	n	–	–	NOB	NOB	NOB	NOB
Temperature (c°)	n	> 33.0	>·33.0	> 33.0	–	–	Δ > 3
pH	n	7.5-8.9	7.0-8.5	7.0-8.5	–	–	**
Salinity (ppt) (per cent)	n	29-35	Δ > 10	Δ > 10	–	–	**
Transparency (m) (per cent)	n	Δ > 10	Δ > 10	Δ > 10	Δ > 10	–	**
DO (mg/l)	n	< 4	< 4	< 4	–	–	**
Total coliform (MPN/100 ml)	n	–	–	> 1,000	> 1,000	–	–
Fecal coliform (MPN/100 ml)	n	–	–	–	–	–	–
NO_3 –N (mg/l)	n	n	n	–	–	–	**
PO_4 –P (mg/l)	n	n	n	–	–	–	**
Hg (mg/l)	n	> 0.0001	> 0.0001	> 0.0001	–	–	> 0.0001
Cd (mg/l)	n	> 0.005	> 0.005	> 0.005	–	–	> 0.005
Cr (mg/l)	n	> 0.1	> 0.1	> 0.1	–	–	**
Cr. hex (mg/l)	n	> 0.05	> 0.05	> 0.05	–	–	> 0.1
Pb (mg/l)	n	> 0.05	> 0.05	> 0.05	–	–	**
Cu (mg/l)	n	> 0.05	> 0.05	> 0.05	–	–	**
Mn (mg/l)	n	> 0.1	> 0.1	> 0.1	–	–	**
Zn (mg/l)	n	> 0.1	> 0.1	> 0.1	–	–	**
Fe (mg/l)	n	> 0.3	> 0.3	> 0.3	–	–	**
F (mg/l)	n	> 1.5	> 1.5	> 1.5	–	–	**
Residus Cl_2 (mg/l)	n	> 0.01	> 0.01	> 0.01	–	–	**
Phenols (mg/l)	n	> 0.03	> 0.03	> 0.03	–	–	**
NH_3 –N (mg/l)	n	> 0.4	> 0.4	> 0.4	–	–	**
Sulfide (mg/l)	n	> 0.01	> 0.01	> 0.01	–	–	**
CN^- (mg/l)	n	> 0.01	> 0.01	> 0.01	–	–	**
PCS (mg/l)	n	n	n	n	–	–	**
Total Chlorinated pesticides (ug/l)	n	> 0.05	> 0.05	> 0.05	–	–	**
Radioactivity							
α-Gross (Becqueral/l)	n	> 0.1	> 0.1	> 0.1	–	–	**
β-Gross (Becqueral/l)***	n	> 1.0	> 1.0	> 1.0	–	–	**

Notes:
NOB = Not objectionable, NV = not visible, n = natural condition.
Δ = Change from natural condition.
* = Not include natural floatable solids, ** = may be established as necessary.
*** = Not include natural Potassium 40.
> = Not more than, < = not less than.

Table 2. Domestic effluent Guidelines in Thailand

Parameters	Units	Domestic effluent classification for community group (persons)			
		A (> 2500)	B (501-2500)	C (101-500)	D (< 101)
1. BOD^{20}*	mg/dm^3	20	30	60	90
2. Solids					
2.1 SS	mg/dm^3	30	40	50	60
2.2 Settleable S.	mg/dm^3	0.5	0.5	0.5	0.5
2.3 TDS**	mg/dm^3	+500	+500	+500	+500
3. Sulfide	mg/dm^3	1.0	1.0	3.0	4.0
4. Free residual chlorine***	mg/dm^3	0.3	0.3	–	–
5. Nitrogen					
5.1 TKN	mg/dm^3	–	–	40	40
5.2 ORG–N	mg/dm^3	10	10	15	15
5.3 NH_3–N	mg/dm^3	–	–	25	25
5.4 NO_3–N	mg/dm^3	–	–	–	–
6. pH	mg/dm^3	5-9	5-9	5-9	5-9
7. Oil and grease	mg/gm^3	20	20	20	20
8. Fecal coliform	MPN/100 cm^3	–	–	–	–
9. Phosphate	mg/dm^3	–	–	–	–

Remarks: A, B, C, D, size of community with more than 2500, between 501-2500, between 101-500 and less than 101 persons respectively.[4]

* Settled BOD (30 min).
** More than TDS of used water.
*** Maximum allowance under epidemic condition only.

Table 3. Proposed interim national water quality standards for Malaysia

Parameter		Classes					
	(Units)	I	IIA	IIB	III	IV	V
Ammoniacal Nitrogen	mg/l	0.1	0.3	0.3	0.9	2.7	> 2.7
BOD	mg/l	1	3	3	6	12	> 12
COD	mg/l	10	25	25	50	100	> 100
DO	mg/l	7	5-7	5-7	3-5	< 3	< 1
pH		6.5-8.5	6-9	6-9	5-9	5-9	–
Colour	TCU	15	150	150	–	–	–
Election condition*	u mhos/cm	1,000	1,000	–	–	6,000	–
Floatables		N	N	N	–	–	–
Odour		N	N	N	–	–	–
Salinity*	/oo	0.5	1	–	–	2	–
Taste		N	N	N	–	–	–
Total dissemination Solid*	mg/l	500	1,000	–	–	4,000	–
Total suspended Solids	mg/l	25	50	50	150	300	> 300
Temperature	C	–	Normal	–	Normal	–	–
Turbidity	NTU	5	50	50	–	–	–
Fecal coliform**	counts/100 ml	10	100	400	5,000 (20,000)	5,000 (20,000)[a]	–
Total coliform	counts/100 ml	100	5,000	5,000	50,000	50,000	> 50,000
		I	IIA/IIB		III#	IV	V
Al	mg/l		–		–(0.06)0.5		
As	mg/l		0.05		0.4(0.05)	0.1	
Ba	mg/l		1		–	–	
Cd	mg/l		0.01		0.01*(0.001)	0.01	
Cr (VI)	mg/l		0.05		1.4(0.05)	0.1	
Cr (III)	mg/l		–		2.5	–	
Cu	mg/l		1		–	0.2	
Hardness	mg/l		250		–	–	
Ca	mg/l		–		–	–	
Mg	mg/l		–		–	–	
Na	mg/l		–		–	3 SAR	
K	mg/l		–		–	–	
Fe	mg/l		0.3		1	1 (leaf) 5 (others)	
Pb	mg/l	NATURAL LEVELS	0.05		0.02*(0.01)	5	LEVELS ABOVE IV
Mn	mg/l		0.1		0.1	0.2	
Hg	mg/l		0.001		0.004(0.0001)	0.002	
Ni	mg/l		0.05		0.9*	0.2	
Se	mg/l		0.01		0.25(0.04)	0.02	
Ag	mg/l		0.05		0.0002	–	
Sn	mg/l		–		0.004	–	
U	mg/l		–		–	–	
Zn	mg/l		5		0.4*	2	
B	mg/l		1		–(3.4)	0.8	
Cl	mg/l		200		–	80	
Cl_2	mg/l		–		–(0.02)	–	
CN	mg/l		0.02		0.06(0.02)	–	
F	mg/l		1.5		10	1	
NO_2	mg/l		0.4		0.4(0.03)	–	
NO_3	mg/l		7		–	5	
P	mg/l		0.2		0.1	–	
Si	mg/l		50		–	–	
SO_4	mg/l		250		–	–	
S	mg/l		0.05		–(0.001)	–	
CO_2	mg/l		–		–	–	
Gross-A	ba/l		0.1		–	–	
Gross-B	ba/l		1		–	–	
Ra-226	bq/l		< 0.1		–	–	
Sr-90	bq/l		< 1		–	–	

Table 3 *(Continued)*

	(Units)	I	IIA/IIB	III#	IV	V
CCE	ug/l		500	–	–	
MRAS? BAS	ug/l	N	500	5,000(200)	–	–
O and G (mineral)	ug/l	A	40; N	N	–	–
O and G (emulsified edible)	ug/l	T	7,000; N	N	–	–
PCB	ug/l		0.1	6(0.05)	–	–
Phenol	ug/l	L	10	–	–	–
		E				–
Aldrin/Dieldrin	ug/l	V	0.02	0.2(0.01)	–	
		E				–
BHG	ug/l	L	2	9(0.1)	–	
Chlordane	ug/l	S	0.08	2(0.02)	–	–
t-DDT	ug/l		0.1	1(0.01)	–	–
Endosulfan	ug/l	O	10	–	–	–
Heptachlor/Epoxide	ug/l	R	0.05	0.9(0.06)	–	–
						–
Lindane	ug/l	A	2	3(0.4)	–	
		B				–
2, 4-D	ug/l	S	70	450	–	
2, 4, 5-T	ug/l	E	10	160	–	–
2, 4, 5-TP	ug/l	N	4	850	–	–
Paraquat	ug/l	T	10	1,800	–	–

N = Free from visible film, sheen, discoloration and deposits.
# = Maximum (unbracketed) and 24 hours average (bracketed) concentrations.

Source: DOE, Malaysia.

Class I represents water bodies of excellent quality. Standards are set for the conservation of natural environment in its undisturbed state. Water bodies such as those in the national park areas, fountain-heads, and in high land and undisturbed areas come under this category where strictly no discharge of any kind is permitted. Water bodies in this category meets the most stringent requirements for human health and aquatic life protection.

Class II represents water bodies of good quality. Most existing raw water supply sources come under this category. In practice, no body contact activity is allowed in this water for the prevention of probable human pathogens. There is a need to introduce another class for water bodies not used for water supply but of similar quality which may be referred to as Class IIB. The determination of Class IIB standards is based on criteria for recreational use and protection of sensitive aquatic species.

Class III is defined with the primary objective of protecting common an moderately tolerant aquatic species of economic value. Water under this classification may be used for water supply with extensive/advanced treatment. This class of water is also defined to suit livestock drinking needs.

Class IV defines water quality required for major agricultural irrigation activities which may not cover minor applications to sensitive crops.

Class V represents other waters which do not meet any of the above uses.
1 Standards for other parameters are also given in the originals list (DOE, 1987).

Table 4. Environmental quality act 1974 environmental quality (sewage and industrial effluents) regulations 1974 {regulations 8(1), 8(2), 8(3)} parameter limits of effluent of standards A and B

Parameter		Unit	Standard		Parameter		Unit	Standard	
			A	B				A	B
i)	Temperature	°C	40	40	xiii)	Copper	mg/l	0.20	1.0
ii)	pH Value	–	6.0-9.0	5.5-9.0	xiv)	Manganese	mg/l	0.20	1.0
iii)	BOD5 at 20C	mg/l	20	50	xv)	Nickel	mg/l	0.20	1.0
iv)	COD	mg/l	50	100	xvi)	Tin	mg/l	0.20	1.0
v)	Suspended Solids	mg/l	50	100	xvii)	Zinc	mg/l	1.0	1.0
vi)	Mercury	mg/l	0.005	0.05	xviii)	Boron	mg/l	1.0	4.0
vii)	Cadmium	mg/l	0.01	0.02	xix)	Iron (Fe)	mg/l	1.0	5.0
viii)	Charomium, Hexavalen	mg/l	0.05	0.05	xx)	Phenol	mg/l	0.001	1.0
ix)	Arsenic	mg/l	0.05	0.10	xix)	Free Chlorine	mg/l	1.0	2.0
x)	Cyanide	mg/l	0.05	0.10	xxii)	Sulphide	mg/l	0.50	0.50
xi)	Lead	mg/l	0.10	0.5	xxiii)	Oil and Grease	mg/l	not detectable	10.0
xii)	Chromium, Triyalent	mg/l	0.20	1.0					

Source: DOE, Malaysia.

Standard A: Discharge above any drinking water intake point.
Standard B: Discharge below any drinking water intake point.

ANNEX VI

NOISE EMISSION AND AIR QUALITY STANDARDS IN THAILAND AND MALAYSIA

Table 1 - 3

Table 1. Motor vehicle noise emission standards in Thailand

Organization	Type of motor vehicle	Standards and methods of measurement	Remarks
(1) ONEB (Office of the National Environment Board)	All type	(1) The noise level shall not exceed 85 dBA measured at 7.5 meters from th exhausted pipe or 100 dBA at 0.5 meter from the exhausted pipe. (2) Use maximum value of the two measurements when different value of the two measurements is not more than 2 dBA (3) The motor vehicle is stationary and engine conditions during measurement vary accordings to type of engine as follow: (a) Diesel engine: maximum rotating speed. (b) Gasoline engine: no-load acceleration at 3/4 of maximum rotating speed. (c) Motorcycle If maximum rotating speed is more than 5,000 rev./min the measurement shall be done at 1/2 of maximum rotating speed. If the maximum rotating speed is less than 5,000 rev./min the measurement shall be done at 3/4 of maximum rotating speed.	Details of tested field, equipment and calibration and others are stated.
(2) The Police Department	All types	Motor vehicle is stationary and in normal used engine condition. The noise level shall not exceed 85 dBA measured at 7.5 meters for the exhausted pipe or 100 dBA measured at 0.5 meter from the exhausted pipe.	No other details on tested field, equipment and calibration are stated.
(3) Department of, Land Transport	All types	The motor vehicle is stationary. Both engine conditions of diesel and gasoline engine during measurement and also the noise level standards are the same as stated in ONEBs standards and methods of measurement.	Details on tested field, equipment and calibration are stated more or less the same as ONEB

Penalty: (1) ONEB: none.

(2) The police department

Whoever violate the regulation for the first time will be fined for five hundred bath for motor vehicle, two hundred baht for motorcycle and for the second time the fine will be two thousand baht.

(3) Department of Land Transport

The fine will be within fifty thousand baht.

Sources: (1) ONEB

Standards – Notification of office of the National Environment Board, dated November 14, B.E. 2529 (1986 Published in the Royal Government Gazette. Vol. 104, Part 1, dated January 1, B.E. 2530 (1987) p. 54-55.

– Notification of Office of the National Environment Board, dated May 15, B.E. 2530 (1987).

Table 2. National ambient air quality Standards in Thailand

Pollutants	1 hour average value mg/m^3	8 hours average value mg/m^3	24 hours average value mg/m^3	1 year average value mg/m^3	Methods of measurement
Carbon Monoxide (CO)	50	20	–	–	Non-Dispersive Infra red Detection
Nitrogen Dioxide (NO_2)	0.32	–	–	–	Gas Phase Chemiluminescence
Sulfur Dioxide (SO)	–	–	0.30	0.10*	Pararosaniline
Suspended Particulate Matter (SPM)	–	–	0.33	0.10*	Gravimetric-High Volume
Photochemical Oxidant (O_3)	0.20	–	–	–	Chemiluminescence
Lead (Pb)	–	–	0.01	–	Wet Ashing

Note: * = Geometric mean value.

Sources: (1) Standards: Notification of Office of the National Environment Board, No. 2, dated November 6. B.E. 2524, published in the Royal Government Gazette, Vol. 98, Part 197, dated December 1, B.E. 2524 (1981) p. 4,322-4,323.

(2) Methods of Measurement: Notification of the Ministry of Science, Technology and Energy, issued under National Environmental Quality Act B.E. 2518 B.E. 2521, published in the Royal Government Gazette. Vol. 98, Part 197, dated December 1, B.E. 2524 (1981) p. 4,299-4,306.

Table 3. The Malaysia Standards Ambient Air Quality Goals

Pollutants	Averaging period	Concentration	Zone*
Sulfur dioxide (SO_2)	1 year	0.02 ppm	Non-industrial or industrial
	24 hrs	0.05 ppm	Non-industrial
		0.08 ppm	Industrial
	30 min	0.2 ppm	Non-industrial
		0.3 ppm	Industrial
Suspended Particulate Matter (SPM)	1 year	0.04 mg/cu m	Non-industrial
		0.08 mg/cu m	Industrial
	24 hrs	0.05 mg/cu m	Non-industrial
		0.1 mg/cu m	Non-industrial
	30 min	0.1 mg/cu m	Non-industrial
		0.2 mg/cu m	Industrial
Carbon Monoxide (CO)	24 hrs	3.0 ppm	Common or industrial
	8 hrs	9.0 ppm	Common or industrial
	1 hr	35.0 ppm	Common or industrial
	30 min	5.0 ppm	Residential
Sulphuric acid	24 hrs	0.1 ppm	Industiral
H_2SO_4	30 min	0.3 ppm	Industiral
Hydrogen sulphide (H_2S)	24 hrs	0.01 ppm	Non-industrial or industrial
	30 min	0.03 ppm	Non-industrial
		0.1 ppm	Industrial
Hydrogen fluoride (HF)	24 hrs	0.001 ppm	Residential
		0.004 ppm	Industrial
	30 min	0.01 ppm	Industrial
Deposited Particulate	1 month	8 tons/sq mile	Special protected area
		10 tons/sq mile	Residential
		15 tons/sq mile	Common/industrial-single source
		30 tons/sq mile	Industrial-complex source
Ammonia (NH_3)	30 min	1.0 ppm	Non-industrial
		5.0 ppm	Industrial-single sources
Carbon disulphide (CS_2)	30 min	0.01 ppm	Non-industrial
		0.1 ppm	Industiral-single source
Chlorine (Cl_2)	30 min	0.01 ppm	Non-industrial
		0.1 ppm	Industrial-single source
Ethylene (CH_2CH_2)	24 hrs	0.01 ppm	Non-industrial or industrial
	1 hr	0.3 ppm	Non-industrial or industrial
Nitrogen-dioxide	24 hrs	0.05 ppm	Non-industrial or industrial
Nitrogen oxide	24 hrs	0.05 ppm	Non-industrial or industrial
Beryllium (Be)	Anytime	0.00001 mg/cu m	Non-industrial or industrial
Calcium oxide	30 min	0.02 mg/cu m	Non-industrial or industrial
Lead (Pb)	24 hrs	0.0007 mg/cu m	Non-industrial or industrial
	30 min	0.02 mg/cu m	Non-industrial or industrial
Sulphate (as H_2SO_4)	1 year	0.004 mg/cu m	Non-industrial or industrial
	30 days	0.01 mg/cu m	Non-industrial or industrial
	24 hrs	0.03 mg/cu m	Non-industrial or industrial
Dark smoke (stack emission)	1 hr	Shade No. 2 Ringelmann chart	
Cement			
(a) Kilns up to 1,500 tons 1 day clinker		450 mg/cu m STP	
1,500 to 3,000 tons		Proportionate	
3,000 tons clinker		600 mg/cu m STP	
Over 3.00		Sliding scale	
(b) Crushing and grinding 1 day clinker (Working environment)		200 mg/cu m STP	

* Non-industrial is equal to residential and common zone

Source: DOE-EQR 1988.